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L17: Entry 2 of 2 File: USPT May 6, 2003

DOCUMENT-IDENTIFIER: US 6559773 B1
TITLE: Reconfigurable display architecture with spontaneous reconfiguration

Abstract Text (1):
A control panel/display subsystem acts as a device portal for interacting with multiple devices interconnected via a dynamic local network. Display content and the human-machine interface (HMI) implemented using the display subsystem automatically reconfigures itself when new devices are added to the vehicle network. An interface specifier enabling each new device to work with the device portal is obtained either from a local archive or a remote archive via connection with a remote network.

Brief Summary Text (2):
The present invention relates in general to a reconfigurable display/control panel for controlling various electronic accessories, and more specifically to an architecture for reconfigurable displays and an overall network for spontaneously interconnecting the displays with various electronic accessories or devices in a manner which automatically reconfigures menu elements shown on the reconfigurable display to interact with each electronic accessory.

Brief Summary Text (3):
Reconfigurable displays are used in automotive vehicles in order to control a plurality of electronic accessories from a single control panel. Such a system reduces cost, saves space on the vehicle instrument panel, and makes the electronic accessories easier to control. A reconfigurable display includes a generic graphic display surface, such as a dot matrix, and a collection of "soft keys" (i.e., programmable buttons). The function of each key is dynamically reconfigured via software to allow access to all the available functions or the accessories, typically using a menu structure. A typical reconfigurable display subsystem may also include a number of "hard keys", buttons that provide instant access to frequently used functions (e.g., navigation, climate control, audio players, etc.).

Brief Summary Text (4):
Because of their generic, reusable nature, reconfigurable automotive displays have facilitated an increase in the number of features that are made available to the user. Consumers are demanding ever-greater functionality from their electronic accessories, while product design cycles of the accessories are simultaneously becoming shorter. Thus, it becomes a major challenge for manufacturers to provide new and innovative system architectures while delivering high content, high quality products and features at a reasonable cost.

Brief Summary Text (8):
The present invention has the advantage of providing a reconfigurable display architecture in which a human-machine interface (HMI) is dynamically constructed in response to the electronic accessories which are present in the system.

Brief Summary Text (9):
In one aspect of the invention, an electronic accessory display/control system is provided for a transportation vehicle. A reconfigurable control panel has a visual display for displaying menu items for an electronic accessory and has at least one control actuator. A human-machine interface controller is coupled to the reconfigurable control panel and includes a local archive for storing a plurality of

interface specifiers. Each specifier defines interaction between the reconfigurable control panel and a respective electronic accessory for performing operations via the menu items using a predetermined communications protocol. The system includes an expandable interconnection link for coupling compatible electronic accessories with the human-machine interface controller. A wireless transceiver is provided for accessing a remote archive of interface specifiers. The remote archive includes interface specifiers each adapted for a corresponding combination of a particular electronic accessory and a particular reconfigurable control panel. The human-machine interface controller responds to a coupling of an electronic accessory to the expandable interconnection link by checking the local archive for presence of a desired interface specifier corresponding to the electronic accessory and the reconfigurable control panel. If the desired interface specifier is not present in the local archive, then the wireless transceiver is activated to automatically obtain the desired interface specifier from the remote archive.

Drawing Description Text (5):
FIG. 4 illustrates the main tasks executed when a new device is joined into the vehicle network.

Detailed Description Text (2):
The present invention creates a device portal within a network architecture having a dynamically constructed human-machine interface (HMI). A control panel/display subsystem includes a collection of hard and soft controls and is made available as a network resource on a dynamic local network. The display subsystem of the device portal may include standard embedded features such as an audio tuner or CD player, but its main purpose is to be dynamically reconfigurable to interact with other network resources via a collection of standard protocols. These other network resources include devices such as a navigation system, cellular phone, audio player, a palm-size PC, or any other device employing an HMI in the vehicle. These devices need not be present in the network at all times. Using Java/Jini technology or similar technology, a dynamic network can be constructed which allows automatic installation of devices into the network.

Detailed Description Text (4):
An HMI for a particular electronic accessory device includes graphical display elements to identify the device and its available features. A menu screen for each accessory device includes labels to be displayed associated with particular soft keys 12-17 to identify controllable functions of the device. For the electronic accessory of a cellular phone, the soft keys may be associated with cellular phone functions of accessing memory locations, initiating a call, ending a call, or other functions performable by the phone. Display-screen 11 can also be used to display event information as communicated from the cellular phone, such as connection status, duration of call, and other information communicated by the cellular phone to display subsystem 10.

Detailed Description Text (5):
The use of the reconfigurable display subsystem as a device portal in a dynamic local network is shown in FIG. 2. Reconfigurable display subsystem 30 includes a display screen 31 and hard and soft keys 32. Display subsystem 30 may also receive input commands from a voice recognition unit 33. An HMI controller 34 resides in display subsystem 30 and controls graphical display screen 31, monitors keys 32, accepts input from voice recognition (VR) unit 33, and interfaces with devices on the dynamic local network 36. A memory 35 stores interface specifiers (i.e., drivers) used by controller 34 to drive graphic display screen 31 and to communicate with the various electronic accessory devices on dynamic local network 36.

Detailed Description Text (7):
Dynamic local network 36 includes a collection of software and communication specifications and standard protocols for hardware interconnection. Examples of such a system are Jini by Sun Microsystems, Inc., JetSend by Hewlett-Packard, and Bluetooth by the Bluetooth Special Interest Group. System resources such as reconfigurable display subsystems, electronic accessories or other components can join the network automatically once they are connected to it. Network 36 recognizes the coupling of a new device to the network and interacts with all the network resources as appropriate to enable operation of the new device within the network. Examples of electronic

accessories connected to the network in FIG. 2 include a cellular phone 40, an MP3 audio player 41, and a palm-sized PC or personal digital assistant (PDA) 42. Once connected to the network 36, these accessories will communicate core functionality control signals and messages with a particular display subsystem. Thus, the accessory and the reconfigurable display subsystem will exchange messages concerning control actions and state changes or events but would not include specific messages on how to display messages or how the display is to be driven.

Detailed Description Text (8):
Each device 40-42 includes a unique device type identifier. Each device type may interact with a predetermined reconfigurable display type using an interface specifier developed for the combination of device and display subsystem. Thus, when HMI controller 34 detects the presence of a new electronic accessory, it determines the device type for the accessory and checks whether it currently has an interface specifier to support interaction with the device stored in memory 35. If the desired interface specifier is present, then HMI controller 34 can communicate core functionality messages between the reconfigurable display and the accessory device. If an appropriate interface specifier is not already contained in memory 35, then HMI controller 34 takes steps to retrieve an appropriate interface specifier, if possible.

Detailed Description Text (9):
A memory in each reconfigurable display subsystem provides a local archive for storing a plurality of interface specifiers each of which defines interaction between the reconfigurable display subsystem and a respective electronic accessory. Whenever an additional interface specifier must be retrieved, it may preferably be obtained using a universal resource locator (URL) of a server that contains a further collection of HMI interface specifiers. Such a server may also be a local archive in the vehicle directly connected to dynamic local network 36 as shown by a server 43 in FIG. 2. Server 43 is a local server containing a first group of HMI interface specifiers 44 corresponding to the configurable display type zero. Additional HMI interface specifiers are stored in other groups for other reconfigurable display types as shown. For each reconfigurable display type, a plurality of interface specifiers are stored as indexed by device type. Server 43 may be constructed with some interface specifiers contained in a read-only memory (ROM) in order to provide a fixed set of interface specifiers for a known set of electronic accessories which are expected to be utilized in a particular vehicle. In addition, re-writeable memory may also be included for subsequent storage of interface specifiers for other device types in order to provide flexibility for growth.

Detailed Description Text (10):
In order to accommodate electronic accessory devices not included in local server 43, the present invention also provides access to a remote archive web server outside the vehicle. Thus, a wireless modem 45 is interconnected with dynamic local network 36 and can be used to communicate with a remote wireless modem 46 which is connected to a remote web server 47 containing additional interface specifiers in a remote archive. Remote server 47 may be connected to the world-wide web or internet and wireless modem 46 may be connected to an internet service provider (ISP), for example. The URL address for remote server 47 may be a predetermined address as defined by convention and stored in either local server 44 or HMI controller 34, for example. Preferably, the URL address of an remote archive may be obtained directly from each accessory device itself. Thus, cellular phone 40 stores a remote archive address providing the URL to the other resources on dynamic local network 36. Thus, cellular phone 40 stores URL of www.visteon.com/hmicode where an appropriate interface specifier corresponding to cellular telephone device type 0 and a plurality of reconfigurable display types are stored. Thus, as new electronic accessory devices are developed, interface specifiers can also be developed in order to interface the new device with the existing reconfigurable display types. The location from where these interface specifiers can be retrieved is stored in the new accessory device, thus making the device compatible with all reconfigurable displays of those types.

Detailed Description Text (11):
FIG. 3 shows the various software elements required in the system of FIG. 2, including software elements comprising the HMI itself, (i.e., the interface between the display subsystem and the accessory device and software for driving the display). Thus, a

human-machine interface software element 50 provides application objects for a particular accessory such as climate control, radio tuner, wireless information service, e-mail, cellular phone, audio, CD player, or others. These objects interact with other objects in an HMI widgets component library 51 including such objects as button metaphor (i.e., button icon and identification of corresponding soft key), list box, window, text box, time, and others. These objects interact with graphics primitives 52 providing a graphics device interface. These graphics primitives define vector shapes, raster elements, perform window management, and provide graphic attributes. These primitives interact with software for display frame buffer 53 for managing display activation such as target selection, visibility selection, and drawing mode.

Detailed Description Text (12):
More specifically, an interface specifier which would be downloaded from either a local or a remote archive contains compiled software class objects that collectively implement an application specific HMI for the unique display driver/accessory device combination. In a Java implementation, these objects will be precompiled from Java source code into Java bytecodes which are the instructions that run on the Java Virtual machine (JVM). Some of these downloaded objects implement an overall HMI for the specific class of application of the accessory device, such as cellular phone, compact disc player, or address book. Some of the other downloaded objects are generic (i.e., application independent) and can be applied to a wide range of applications. These generic, reusable components or widgets may typically already reside in the display subsystem, but may be included in a downloaded interface specifier for completeness and flexibility to use display subsystems not already containing the widgets. Downloading may include the capability to identify objects already residing in the display subsystem and then only downloading objects which are in fact needed.

Detailed Description Text (13):
The behavior of a particular HMI is embedded in the collection of class objects within the interface specifier and include four main functional areas: 1) processing user input events, 2) processing device events, 3) rendering graphic displays, and 4) sending commands to devices.

Detailed Description Text (14):
User input events are generated when a user manipulates a control actuator of the display subsystem, such as pressing a button, issuing a voice command, manipulating the pointing device such as a mouse or track ball, or otherwise initiates a control action. Physical device events are represented by software abstractions and are reported to the accessory device via the dynamic local network. Examples of physical device events include button pressed, button held, button released, switch closed, switch opened, pointing device position change, pointing device pressed, pointing device held, and pointing device released. The control actuator being used may be physically contained on the display subsystem or may be remotely connected to the display subsystem, such as a pointing device mounted on a steering wheel in the vehicle.

Detailed Description Text (15):
Objects for processing device events provide notification to the display subsystem of state changes occurring within the electronic accessory device. Specific device events depend upon the functionality of the particular electronic accessory device. For an electronic accessory device providing navigation features, examples of device events include notification of a pending route maneuver, vehicle approaching destination, vehicle off-route, and others.

Detailed Description Text (16):
With regard to software objects to render graphics on the visual display, these objects respond to user input or device or system events (e.g., power-up initialization) to initiate and execute all required rendering operations. The HMI interface specifier embeds the knowledge of how to display the information, including font size, screen location, number of digits, size and shape of graphic elements, timing for animated components, etc.

Detailed Description Text (17):
The software objects include those that send predetermined commands to the electronic

accessory devices in order to enable the user to control and monitor the devices. Some typical examples include incrementing or decrementing a CD track selection, selecting an FM radio pre-set, adjusting the time-of-day clock, setting climate control temperature or fan speed, dialing a phone number, and others. The specific implementation of the user interface specifier can enable these actions in many different ways. These objects correlate user input events with the corresponding control action.

Detailed Description Text (18):
A preferred method of the present invention will be described in connection with FIG. 4. The sequence of steps shows interaction between an accessory device 60, a reconfigurable display subsystem 61, and a server 62 containing an archive of interface specifiers. Device 60 is a pluggable device such as a cellular phone, palm-size PC, or MP3 player and is identified via a device type identifier which is embedded into the device's persistent storage, such as ROM or FLASH. Persistent storage also contains a universal resource locator (URL) that indicates the location of an HMI server containing interface specifiers corresponding to the device. Display subsystem 61 likewise has its own display type identifier embedded into persistent storage. Server 62 may be a local server or a world-wide web server containing collections of HMI interface specifiers for the various display subsystem and accessory device combinations. The server processes requests for interface specifiers which include the device type identifier and the display type identifier. The first phase of the process is registration. In registration, device 60 communicates its presence to resources on the dynamic local network and provides its device type identifier and the URL of a server containing a collection of interface specifiers corresponding to the device. The second phase of the process is an HMI check in which the display subsystem 61 checks to see if it already has an interface specifier supporting the accessory device represented by the device type identifier. If a supporting interface specifier is already present, then the device automatically begins to use the display subsystem as a device portal.

Detailed Description Text (21):
In order to minimize the amount of memory required for storing interface specifiers, and to simultaneously reduce download times required, a memory manager or caching technique is used for storing interface specifiers. Preferably, a memory in any individual subsystem is large enough to hold interface specifiers to service the complete maximum load of accessory devices that may be in operation using the display subsystem at any one time. Since some devices may be disconnected after having been used in the system, some interface specifiers may be present in memory in a display subsystem for which the original accessory device is no longer present in the network. According to the present invention, any such inactive interface specifier is given a lower priority than active interface specifiers. Furthermore, the longer an interface specifier has been inactive, the lower priority it is given relative to other inactive interface specifiers. If the amount of remaining free memory becomes restricted, the HMI controller deletes the lowest priority interface specifiers to make room for additional interface specifiers for other accessory devices that have joined the network. Priority assignments may also take into account file size and/or frequency of use so as to minimize overall downloading to restore interface specifiers that have been deleted.

Detailed Description Text (23):
With regard to the dynamic local network, this may take the form of an RF-wireless network using the Bluetooth specification, for example. When a wireless-capable accessory comes within communication distance of the dynamic local network, this is detected by means of a wireless polling signal exchanged between the local network and the new device. Based on a response to the polling signal, the devices exchange network messages to establish the new device as a resource available to devices on the local network.

Current US Cross Reference Classification (4):
701/29

Current US Cross Reference Classification (5):
701/33

CLAIMS:

1. An electronic accessory display/control system for a transportation vehicle, comprising: a reconfigurable control panel having a visual display for displaying menu items for an electronic accessory and having at least one control actuator; a human-machine interface controller coupled to said reconfigurable control panel and including a local archive for storing a plurality of interface specifiers, each specifier defining interaction between said reconfigurable control panel and a respective electronic accessory for performing operations via said menu items using a predetermined communications protocol; an expandable interconnection link for coupling compatible electronic accessories with said human-machine interface controller; and a wireless transceiver for accessing a remote archive of interface specifiers, wherein said remote archive includes interface specifiers each adapted for a corresponding combination of a particular electronic accessory and a particular reconfigurable control panel; wherein said human-machine interface controller responds to a coupling of an electronic accessory to said expandable interconnection link by checking said local archive for presence of a desired interface specifier corresponding to said electronic accessory and said reconfigurable control panel, and if said desired interface specifier is not present in said local archive then activating said wireless transceiver to automatically obtain said desired interface specifier from said remote archive.

2. The electronic accessory display and control system of claim 1 wherein said desired interface specifier assigns a predetermined function to said control actuator.

3. The electronic accessory display and control system of claim 1 wherein said expandable interconnection link is comprised of a dynamic local network.

4. The electronic accessory display and control system of claim 3 wherein said dynamic local network is comprised of a wireless network, and wherein presence of new electronic accessories is detected automatically in response to a wireless polling signal.

5. The electronic accessory display and control system of claim 1 wherein said compatible electronic accessories each provide to said human-machine interface controller a unique device identifier and a remote network address for said remote archive.

6. The electronic accessory display and control system of claim 1 wherein said interface specifiers are comprised of software objects.

7. The electronic accessory display and control system of claim 6 wherein said software objects include objects to process user events initiated by said control actuator.

8. The electronic accessory display and control system of claim 6 wherein said software objects include objects to process device events corresponding to a state change within said electronic accessory.

9. The electronic accessory display and control system of claim 6 wherein said software objects include objects to render graphics on said visual display.

10. The electronic accessory display and control system of claim 6 wherein said software objects include objects to send predetermined commands to said electronic accessory.

11. The electronic accessory display and control system of claim 1 further including said electronic accessory, and wherein said electronic accessory is comprised of a portable computing device.

12. The electronic accessory display and control system of claim 1 further including said electronic accessory, and wherein said electronic accessory is comprised of a mobile communication device.

13. The electronic accessory display and control system of claim 1 wherein said

control actuator is comprised of a push button switch.

14. The electronic accessory display and control system of claim 1 wherein said control actuator is comprised of a speech recognition unit.

15. The electronic accessory display and control system of claim 1 further comprising a memory manager for prioritizing interface specifiers stored in said local archive and deleting interface specifiers of lower priority when said local archive becomes full.

16. A method of operating an electronic accessory display and control system for a transportation vehicle, said system including a reconfigurable control panel, a human-machine interface controller, an expandable interconnection link for compatible electronic accessories, and a wireless transceiver, said method comprising the steps of: storing a plurality of interface specifiers in a local archive, each interface specifier defining interaction between said reconfigurable control panel and a respective electronic accessory for performing operations via menu items using a predetermined protocol for said reconfigurable control panel; coupling one of said compatible electronic accessories with said human-machine interface controller via said expandable interconnection link; checking, in response to said coupling, said local archive for presence of a desired interface specifier corresponding to said compatible electronic accessory and said reconfigurable control panel; and if said desired interface specifier is not present in said local archive, then activating said wireless transceiver to automatically obtain said desired interface specifier from a remote archive containing an interface specifier adapted for combination of said compatible electronic accessory and said reconfigurable control panel.

17. The method of claim 16 wherein said coupled compatible electronic accessory stores a remote network address of said remote archive.

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Terms	Documents
l19 not 122	48

Database: US Patents Full-Text Database; US Pre-Grant Publication Full-Text Database; JPO Abstracts Database; EPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletins

Search: L23

Refine Search

Recall Text | Clear

Search History

DATE: Thursday, May 22, 2003 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ			
L23	l19 not l22	48	L23
L22	L21 and l19	11	L22
L21	accessor$3 same l3	306	L21
L20	L19 and l9	0	L20
L19	L18 not l14	202	L19
L18	accessor$3 and l13	214	L18
L17	accessor$3 and l15	2	L17
L16	accesor$3 and l15	0	L16
L15	L14 not l10	39	L15
L14	L13 and l9	76	L14
L13	L12 and l5	740	L13
L12	L11 and l3 and l6	813	L12
L11	l1 and vehicle	2868	L11
L10	L9 and l8	37	L10
L9	((701/$)!.CCLS.)	24490	L9
L8	L7 and l6	181	L8
L7	l5 and l4	217	L7
L6	internet	150474	L6
L5	radio frequency or rf or ifrared or wireless	329734	L5
L4	L3 and l2	270	L4
L3	(user or driver or operator) near (input or preference)	105355	L3
L2	L1 same vehicle	885	L2
L1	pda	24868	L1

END OF SEARCH HISTORY

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Generate Collection Print

L10: Entry 10 of 37 File: PGPB Nov 7, 2002

DOCUMENT-IDENTIFIER: US 20020165666 A1
TITLE: System and method for distributed navigation service

Abstract Paragraph (1):
A distributed navigation system and method for providing driving instructions to a user. The system includes a service center having a navigation server and associated workstations. The service center stores driving instructions in a continuously updated map database. In response to a user request the instructions are transmitted by way of a wireless network to a client device residing in the user vehicle. The instructions are assembled into sequential stepwise driving directions and stored in a storage device in the client device. Commands from the user trigger playback of the driving instructions in a stepwise fashion.

Current US Classification, US Primary Class/Subclass (1):
701/209

Current US Classification, US Secondary Class/Subclass (3):
701/211

Summary of Invention Paragraph (9):
[0007] Other prior art systems include a wireless communication device with which a vehicle occupant retrieves driving instructions from a service representative or operator. In such a system, however, the operator does not have a system to quickly analyze the vehicle position. Further, either the operator must stay in voice contact with the vehicle user to continuously relay instructions to the user or the user must record the directions and then refer to them. However, reference to the recorded directions during driving may contribute to a dangerous driving situation.

Detail Description Paragraph (2):
[0013] In the specification, the term "telematic device" or "client device" refers to a device which is generally equipped to receive, process and output information or the like to another device or a user. Historically, telematic devices receive and process digital data including sound, textual and graphic data as, for example, file transfer, electronic mail, facsimiles, electronic posts, data bank access, information center access, images, instructions and multimedia files. While early telematic devices operated in a wired network, many current devices receive data over a wireless network. It should be understood that the present invention contemplates telematic devices that receive data transmitted over a wireless network. Such devices and wireless networks are known in the art.

Detail Description Paragraph (3):
[0014] FIG. 1 is a block diagram generally depicting elements of an embodiment of the present navigation system. The system includes a client device 10 located in a vehicle 8. The client device 10 is a telematic unit that has the capability to transmit signals 32 and receive signals 30 through a wireless communication network or infrastructure 34 as well as several elements described in more detail below. A wireless gateway 36 directs signals to and from the wireless infrastructure 34 to a service center 45. The service center 45 includes a navigation server 40 and a service center workstation 50 and a device to transmit both data and voice information from the navigation server and workstation. The navigation server includes map and directional information. A human operator can operate the workstation 50, which is connected to the navigation server. The navigation server 40 may be accessible,

preferably through Internet connection, by a user's web browser 60, so that the user may set route preferences, store common destinations and plan trips.

Detail Description Paragraph (5):
[0016] The client device 12 may include an audio decoding and playback portion 14. The audio decoding and playback unit 14 receives and stores digital information sent through the wireless infrastructure 34 from the navigation server 40. Audio information is decoded from the digital format and played back or outputted to a speaker in the client device 10 or the vehicle audio system or the like. The unit 14 may contain computer readable program code that plays the decoded information in a stepwise fashion in response to commands from the voice command and control system 10 or the control buttons 18 or a positioning system 20. It should be understood that the information stored in the client device 10 received from the service center 45 may contain textual information and other visual or graphic information. The textual information and other graphic information can be played in a stepwise fashion coinciding with the audio information. Graphic information, including textual information is displayed by the head unit display 16. The present invention includes the transmission of geocoded information, such as images, maps or pictograms. Also geocoded information may form a portion of the transmitted information including road-links and geographic properties or attributes such as latitude, longitude, house numbers or points of interest.

Detail Description Paragraph (7):
[0018] The client device 10 includes a positioning system 20. In one embodiment, the positioning system 20 is a Global Positioning System (GPS). As discussed above, a GPS is used to determine a vehicle's position in the positioning system 20 as is known in the art. The positioning system 20 both determines the present position of the vehicle and transmits 32 the computed position to the service center 45 via the wireless infrastructure 34 through the cellular voice and data network access device 22. The cellular voice and data network access device 22 may be an imbedded cell phone and uses wireless communications standards such as AMPS, TDMA, CDMA, GSM, etc., in order to establish a voice and data connection through the wireless infrastructure and the wireless gateway 36 to the service center 45. The cellular voice and data network access device is well known in the art.

Detail Description Paragraph (8):
[0019] The wireless gateway 36 connects the wireless infrastructure to the service center 45. The service center 45 includes the navigation server 40 and the service center workstation 50. The navigation server 40 includes a database or storage device with map and direction information. The stored information may be updated to reflect current road and driving conditions. The update may be done automatically by real time connection to weather and traffic nodes via the Internet or similar connection. Updating or maintenance may also be performed by system administrators who input road and traffic conditions, and amend routes in view of construction and so on.

Detail Description Paragraph (9):
[0020] The user's web browser 60 may be used to access the navigation server 40 through the Internet. The navigation server 40 can provide user accessible password protected access through which the user may set route preferences, store common destinations and plan trips. When the user requests calculation of a route, the navigation server can access the user's preferences and compare the requested route to the stored preferences. In this manner, the server 40 supplies routes that are input and preferred by the user.

Detail Description Paragraph (12):
[0023] Through the voice connection, the service representative requests the current location 88 of the vehicle to validate that the location given by the positioning system 20 is accurate and compares the verbal location with the location given by the positioning system 20. The user requests that the service representative calculate a route to a given destination 90. The service representative enters the destination 92 into the service center workstation 50 and requests that the user validate the destination. The service representative advises the user that the route will be calculated and downloaded to the client device 10. In an alternate embodiment (not shown), the requested destination may be input by keying a phone number with a keypad, or selecting a phone number, which characterizes the destination address. The

destination information may be input from a portable computing device (PDA, Laptop) via a local wireless link.

Detail Description Paragraph (16):
[0027] In another embodiment, the commands are input by the user actuating control buttons 18 or the like on the client device 10. The control buttons have similar designations as the verbal commands.

L10: Entry 18 of 37 File: USPT May 20, 2003

DOCUMENT-IDENTIFIER: US 6567745 B2
TITLE: System and method for distributed navigation service

Abstract Text (1):
A distributed navigation system and method for providing driving instructions to a user. The system includes a service center having a navigation server and associated workstations. The service center stores driving instructions in a continuously updated map database. In response to a user request the instructions are transmitted by way of a wireless network to a client device residing in the user vehicle. The instructions are assembled into sequential stepwise driving directions and stored in a storage device in the client device. Commands from the user trigger playback of the driving instructions in a stepwise fashion.

Brief Summary Text (9):
Other prior art systems include a wireless communication device with which a vehicle occupant retrieves driving instructions from a service representative or operator. In such a system, however, the operator does not have a system to quickly analyze the vehicle position. Further, either the operator must stay in voice contact with the vehicle user to continuously relay instructions to the user or the user must record the directions and then refer to them. However, reference to the recorded directions during driving may contribute to a dangerous driving situation.

Detailed Description Text (2):
In the specification, the term "telematic device" or "client device" refers to a device which is generally equipped to receive, process and output information or the like to another device or a user. Historically, telematic devices receive and process digital data including sound, textual and graphic data as, for example, file transfer, electronic mail, facsimiles, electronic posts, data bank access, information center access, images, instructions and multimedia files. While early telematic devices operated in a wired network, many current devices receive data over a wireless network. It should be understood that the present invention contemplates telematic devices that receive data transmitted over a wireless network. Such devices and wireless networks are known in the art.

Detailed Description Text (3):
FIG. 1 is a block diagram generally depicting elements of an embodiment of the present navigation system. The system includes a client device 10 located in a vehicle 8. The client device 10 is a telematic unit that has the capability to transmit signals 32 and receive signals 30 through a wireless communication network or infrastructure 34 as well as several elements described in more detail below. A wireless gateway 36 directs signals to and from the wireless infrastructure 34 to a service center 45. The service center 45 includes a navigation server 40 and a service center workstation 50 and a device to transmit both data and voice information from the navigation server and workstation. The navigation server includes map and directional information. A human operator can operate the workstation 50, which is connected to the navigation server. The navigation server 40 may be accessible, preferably through Internet connection, by a user's web browser 60, so that the user may set route preferences, store common destinations and plan trips.

Detailed Description Text (5):
The client device 12 may include an audio decoding and playback portion 14. The audio decoding and playback unit 14 receives and stores digital information sent through the

wireless infrastructure 34 from the navigation server 40. Audio information is decoded from the digital format and played back or outputted to a speaker in the client device 10 or the vehicle audio system or the like. The unit 14 may contain computer readable program code that plays the decoded information in a stepwise fashion in response to commands from the voice command and control system 10 or the control buttons 18 or a positioning system 20. It should be understood that the information stored in the client device 10 received from the service center 45 may contain textual information and other visual or graphic information. The textual information and other graphic information can be played in a stepwise fashion coinciding with the audio information. Graphic information, including textual information is displayed by the head unit display 16. The present invention includes the transmission of geocoded information, such as images, maps or pictograms. Also geocoded information may form a portion of the transmitted information including road-links and geographic properties or attributes such as latitude, longitude, house numbers or points of interest.

Detailed Description Text (7):
The client device 10 includes a positioning system 20. In one embodiment, the positioning system 20 is a Global Positioning System (GPS). As discussed above, a GPS is used to determine a vehicle's position in the positioning system 20 as is known in the art. The positioning system 20 both determines the present position of the vehicle and transmits 32 the computed position to the service center 45 via the wireless infrastructure 34 through the cellular voice and data network access device 22. The cellular voice and data network access device 22 may be an imbedded cell phone and uses wireless communications standards such as AMPS, TDMA, CDMA, GSM, etc., in order to establish a voice and data connection through the wireless infrastructure and the wireless gateway 36 to the service center 45. The cellular voice and data network access device is well known in the art.

Detailed Description Text (8):
The wireless gateway 36 connects the wireless infrastructure to the service center 45. The service center 45 includes the navigation server 40 and the service center workstation 50. The navigation server 40 includes a database or storage device with map and direction information. The stored information may be updated to reflect current road and driving conditions. The update may be done automatically by real time connection to weather and traffic nodes via the Internet or similar connection. Updating or maintenance may also be performed by system administrators who input road and traffic conditions, and amend routes in view of construction and so on.

Detailed Description Text (9):
The user's web browser 60 may be used to access the navigation server 40 through the Internet. The navigation server 40 can provide user accessible password protected access through which the user may set route preferences, store common destinations and plan trips. When the user requests calculation of a route, the navigation server can access the user's preferences and compare the requested route to the stored preferences. In this manner, the server 40 supplies routes that are input and preferred by the user.

Detailed Description Text (12):
Through the voice connection, the service representative requests the current location 88 of the vehicle to validate that the location given by the positioning system 20 is accurate and compares the verbal location with the location given by the positioning system 20. The user requests that the service representative calculate a route to a given destination 90. The service representative enters the destination 92 into the service center workstation 50 and requests that the user validate the destination. The service representative advises the user that the route will be calculated and downloaded to the client device 10. In an alternate embodiment (not shown), the requested destination may be input by keying a phone number with a keypad, or selecting a phone number, which characterizes the destination address. The destination information may be input from a portable computing device (PDA, Laptop) via a local wireless link.

Detailed Description Text (16):
In another embodiment, the commands are input by the user actuating control buttons 18 or the like on the client device 10. The control buttons have similar designations as the verbal commands.

Current US Original Classification (1):
701/209

Current US Cross Reference Classification (2):
701/211

CLAIMS:

1. A method of operating a navigation system for a client device comprising: determining an initial position of the client device; initiating a wireless request for service, the request including transmission of the initial position of the client device; establishing a voice connection, the voice connection providing transmission of a desired position of the client device; and wirelessly receiving by the client device, a calculated route from the initial position to the desired position, wherein the calculated route is in a media format capable of being provided in a stepwise sequential fashion in response to commands.

WEST

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L10: Entry 32 of 37 File: USPT Feb 19, 2002

DOCUMENT-IDENTIFIER: US 6349257 B1
TITLE: System for personalized mobile navigation information

Abstract Text (1):
A mobile navigation system implemented as an embedded system in a vehicle is easy to use, does not detract the driver's attention from the road, and limits the number of choices presented to the user of the navigation system according to a predetermined set of preferences or personalized information. Choices are filtered according to a set of driver preferences, according to the vehicle's geographic position, direction of motion, and the driver's intended itinerary. The itinerary, including intermediate stops, is calculated on an external computing system. The information is downloaded from the computing system to a memory device such as, for example, a smart card. The information is then transferred from the smart card to the embedded vehicle navigation system. In one application of the invention, a kiosk located at a car rental agency may be used to create and store personalized navigation information onto a smart card which the customer then inserts into the vehicle navigation system that is installed in the rental car.

Brief Summary Text (8):
The OnStar.TM. system is a call-centered based system. The driver of a vehicle contacts the call center by cellular telephone. The vehicle's GPS coordinates are automatically sent to the call center. The driver expresses his or her preferences for a route or hotel or restaurant to a call center operator who, in turn, uses the aid of a computer containing navigation information to calculate a route which is relayed to the driver. This system relies on the vagaries of the wireless cellular telephone network and the intervention of a human operator to aid the driver and to make appropriate choices.

Brief Summary Text (10):
The DeLorme system allows the user to calculate a route using a graphical interface on a standalone PC, such as a laptop computer. The user can input route and display preferences manually. The PC may then be placed in the vehicle and used to provide route guidance. The system is cumbersome, requiring the attachment of cables for GPS antenna and power supply. Use of the PC in a moving vehicle is difficult. The DeLorme system also provides the option of downloading route information or map information to a PDA, which may then be placed in the vehicle. Again, this variation of the system is cumbersome to use in a vehicle.

Brief Summary Text (14):
According to the invention, the choices are filtered according to a set of driver preferences, according to the driver's geographic position, direction of motion, and intended itinerary. The itinerary, including intermediate stops, is calculated on an external computing system, such as a standalone personal computer (PC) or network (Web or Internet) based system. The information is downloaded from the PC or Web-based application to an intermediate carrying means such as, for example, a smart card or a personal digital assistant (PDA). The information is then transferred from the smart card or the PDA to the vehicle navigation system.

Detailed Description Text (4):
The computing system 10 may be located within a kiosk 140 at a car rental agency. The computing system 10 may be a simple terminal connected through a network (i.e., an intranet or the Internet) 120 to a trip plan server 110, from which the computing

system 10 may access information on current route conditions (detours, congestion, etc.) so that alternative route information may be computed. The trip plan server 110 in this case performs the computing functions necessary to generate the itinerary.

Detailed Description Text (7):
Other transfer means may be used, including, but not limited to, wireless communications via radio frequency or infrared (IR) or a cable connection from the computing system 10 in the kiosk 140 to the mobile navigation system 14 in a vehicle 160.

Detailed Description Text (8):
In the case of a smart card or PDA, the driver then carries the smart card 12 or PDA to his or her vehicle which contains an embedded mobile navigation system 14. The smart card is inserted into the reader slot or, in the case of a PDA, another connection is made to the memory device to provide the mobile navigation system 14 with the personalized route and preference information calculated by the computing system 10. The mobile navigation system 14 then makes use of the personalized information to customize the information provided to the driver of the vehicle.

Detailed Description Text (10):
FIG. 2 is a flow diagram showing the logic of the software running on the computing system 10 for generating personalized navigation information. The computing system 10 in the first step 202 presents a login screen waiting to authenticate the user. Upon the computing system successfully authenticating the user (either by user name and password or by a security token such as the smart card), the user's profile is retrieved. The computing system 10 then interacts with the user and prompts the user to input his or her itinerary in step 204. The itinerary includes a location or set of locations that the user plans to visit on a trip and a set of preferred routes. The routes can be computed for the user based on user preferences, such as most direct route, most scenic route, etc. FIG. 3 shows an input screen for the user to input his or her itinerary, which will be described in more detail later. The computing system 10 follows in steps 206, 208 and 210 to prompt the user to input preferences for lodgings, restaurants and service stations, respectively. If the user has previously used the system, the computing system may store existing preferences for that user, in which case, the prompts in steps 206, 208 and 210 allow the user to change any of the existing preferences or to simply accept them. For example, the user may prefer to stay in a hotel which is in a certain price range, located within a certain mileage limit, and which is equipped with certain amenities such as a swimming pool and/or data port. The user may also, for example, specify preferred hotel chains. FIGS. 4, 5 and 6 show input screens for the user to set his or her preferences for lodgings, restaurants and service stations, respectively. FIGS. 4 to 6 will be described in more detail later. After the user finishes inputting his or her preferences in steps 204, 206, 208 and 210, the computing systems asks the user in step 212 to confirm the input preferences. If the user does not confirm the input preferences, the user can repeat steps 204, 206, 208 and 210 until he or she is satisfied with the input preferences. If the user confirms the input preferences in step 212, the computing system 10 will prompt the user in step 214 for the type of transfer means and the type of connection from the computing system to the transfer means. Depending on the specified type of transfer means and the type of connection, the computing system 10 will activate the corresponding connection interface and download the itinerary and preferences for points of interest to the transfer means in step 218. In the car rental application, step 214 would be omitted; that is, the user would not be prompted since the transfer means (e.g., smart card) would be pre-defined.

Detailed Description Text (11):
FIG. 3 shows the screen for prompting the user to input his or her itinerary which is a location or set of locations the user plans to visit during the trip planned. There are two text areas in the center of the screen. One 301 is labeled with "location" and the other 302 is labeled with "Your itinerary". The text area 301 labeled with "Location" is for the user to type in the name or address of the locations he or she plans to visit. When the user finishes typing the name or addresses of a location, he or she presses (i.e., clicks on) the "Add" button 303 on the right to add this location to the user's itinerary 302. If the user inputs a wrong location or if the user later decides not to visit a location which is on his or her itinerary, he or she can select that location at 301 and press (i.e., click on) the "Remove" button 304 to

remove that location from his or her itinerary.

Detailed Description Text (12):
FIG. 4 shows the screen for prompting the user to input lodging preferences. Input is made by checking, by means of a mouse click, various boxes in the right hand side of the screen. The choices are labeled "Price Rating you prefer", "Lodge style you prefer", "Other facilities required", and "Time to reach". Five choices based on the AAA diamond ratings are provided under the "Price Rating you prefer". Other recognized ratings may be used or, in the alternative, price ratings may be defined for this particular application. The user may check any one of these. The input may be made mandatory, meaning that the user must select one of the price ratings before the input screen is accepted by the system, or optional, meaning that the user need not make a selection and thereby can broaden the results of the data base search. It would also be possible to allow the user to select a range by allowing the user to check, say, boxes 2 and 4. Next, the user is given a choice of motel or hotel for "Lodge you prefer". This category could also be expanded to include bed-and-breakfasts, for example. Several choices are provided to the user under "Other facilities required". These include phone access, Internet access, television, swimming pool, restaurant, and pets allowed. Other and/or different facilities may also be included such as, for example, fitness center, laundry and dry cleaning service, and business office. None or multiple selections could be made; however, the more selections made would result in restricting the search results. Finally, under "Time to reach", the user is offered various time periods from which to select and which relate to the time it takes to travel to the lodging form the primary route taken for the trip.

Detailed Description Text (13):
FIG. 5 shows the screen for prompting the user to input restaurant preferences. The choices here are broken down into subcategories of "Breakfast", "Lunch" and "Dinner". Each subcategory provides the user with choices of "Price Rating you prefer", "Food Style you prefer" and "Time to reach the restaurant". The price rating in this example is again based on the AAA diamond ratings and, again, other ratings may be employed. The "Food Style you prefer" gives the user several choices based on nationality and vegetarian. The choices could also be expanded to include various fast food franchises which can be particularly important when traveling with children who are known to have very definite preferences and/or who, for example, are collecting the current give away toys.

Detailed Description Text (14):
FIG. 6 shows the screen for prompting the user to input service station preferences. There are four categories in this input screen. The first is the type of fuel required, and the choices are gasoline and diesel. This latter choice can be critical since many service stations do not carry diesel fuel. The next category, "Other facilities required", include selections like "Car Wash", "Snacks" and "Coffee". Other selections could be added, but as in all these screens, the more selections a user makes, the more restricted will be the results of the data base search. The category "Preferred Gas Company(s)" allows the user to specify which gas companies the user prefers, possibly based on which credit cards the user has. This category could be expanded to include other types of credit or debit cards, such as VISA.RTM., American Express.RTM. and Master Card.RTM. cards.

Detailed Description Text (16):
The system control unit 702 further executes four computer processes; the user interface manager 704, the search manager 706, the itinerary manager 708, and the navigation manager 710. The user interface manager accepts service requests from the user and presents to the user the results in response to the user's requests. The user interface manager 704 also updates the user about the status of the mobile navigation system 14 and prompts the user for imminent maneuvers when the user's attention is needed. The search manager 706 will search the points of interest contained in the digital map 722 based on the user's preferences stored in the storage means 724. The itinerary manager 708 keeps track of the location(s) the user wants to visit based on the itinerary information stored in the storage means 724. It frees the user from manually entering the destination information that the user has planned to visit. The navigation manager 710, after receiving a new destination request from the user interface manager 704, reads the current vehicle position from the location means, maps the current vehicle position to the digital road map, computes a route to the

destination, and gives the user turn-by-turn instructions via the user interface manager 704 and I/O system 712.

Detailed Description Text (18):
FIG. 9 shows the flow diagram of the search manager 706. Upon receiving a search request from the user in step 902 via the user interface manager 704, the search manager 706 in step 904 parses the request and obtains the information pertaining to the search from the request itself (if this request is a custom search), or from the itinerary (if the request is based on a pre-defined search profile). The search manager 706 then obtains the position of the reference point for the search in step 906. If the reference point for the search is the current position, the search manager will obtain the position information from the location means 720. The search manager 706 then proceeds to step 908 to look up the digital map and construct an initial list of points of interest based on the distance constraint, for example, within, say, twenty miles from the current position. The search manager 706 follows in step 910 to prune this list by the itinerary constraint. For example, the user wants no more than five miles of deviation from the routes defined in his current itinerary. The search manager 706 further in step 912 prunes the list of points of interest by the required attributes such as price ranges, styles and other user preferences. Finally, the resulting list is ordered according to the user's preference in step 914 and is sent to the user interface manager in step 916.

Current US Original Classification (1):
701/200

Current US Cross Reference Classification (2):
701/117

Current US Cross Reference Classification (3):
701/24

CLAIMS:

10. The system of claim 9, wherein the mobile navigation system comprises:

a database of points of interest;

storage means for storing personalized navigation information;

means for determining the position and heading of the vehicle;

an input means for the driver to select the desired service items presented to the driver;

an output means for presenting the available service items to the driver;

search means for finding a point of interest in the database according to the personalized navigation information and the driver's input;

means for setting the selected point of interest as the destination; and

means for guiding the driver from a current position to the destination.

L10: Entry 27 of 37 File: USPT Aug 6, 2002

DOCUMENT-IDENTIFIER: US 6429812 B1
TITLE: Mobile communication device

Brief Summary Text (4):
A number of devices are known which provide mobile telecommunication capabilities. Further, known position detection systems employ the known Global Positioning System (GPS), Global Orbiting Navigational System (GLONASS), Loran, RF triangulation, inertial frame reference and Cellular Telephone base site, e.g., time difference of arrival (TDOA) or nearest antenna proximity systems. Known GPS mobile systems include memory to record location, time and event type, and some systems may be integrated with global information systems, to track path, speed, etc. Known Differential GPS (DGPS) systems include mobile telecommunication functionality to communicate between distant units, typically to allow very precise relative position measurements, in the presence of substantial absolute position errors, or to calibrate the position of a mobile transceiver based on a relative position with respect to a fixed transceiver having a known location. These systems do not typically intercommunicate event information between units. Thus, the communications streams relate to position information only. However, known weather balloon transceiver systems, for example, do transmit both position and weather information to a base station.

Brief Summary Text (14):
Many applications of GPS including mineral surveying, mapping, adding attributes or features to maps, finding sites on a map, vehicle navigation, airplane navigation, marine navigation, field asset management, geographical information systems, and others require the enhanced accuracy that is available with DGPS. For instance, a 20 to 100 meter error could lead to unintentional trespassing, make the return to an underground asset difficult, or put a user on the wrong block while walking or driving in a city. These applications require a computer to store and process data, retain databases, perform calculations, display information to a user, and take input from a user entry. For instance, the user may need to store a map database, display a map, add attributes to features on the map, and store these attributes for geographical information. The user may also need to store and display locations or calculate range and bearing to another location.

Brief Summary Text (29):
Many systems using handheld computers, having software and databases defining maps and running standard operating systems, have been coupled to GPS Smart Antennas. Wireless, infrared, serial, parallel, and PCMCIA interfaces have been used to interconnect the handheld computer and the GPS Smart Antenna. Differential-ready GPS Smart Antennas having an input to receive signals representative of DGPS error corrections are also commercially available. Further, GPS receivers and Differential-ready GPS Smart Antennas which are self contained, built onto a type II PCMCIA card (PC Card), and/or having serial data communications ports (RS-232 or RS-422) are commercially available. See, U.S. Pat. Nos. 5,276,451, and 5,210,540, assigned to Pioneer Electronic Corporation.

Brief Summary Text (31):
Other known systems employ speech recognition as a user input. For example, another system, described in U.S. Pat. No. 5,274,560 does not use GPS and has no sensing devices connected to the vehicle. The routing information is contained in a device that is coupled to a CD player in the vehicle's audio system. Commands are entered into the system via a microphone and the results are outputted through the vehicle's

speakers. The vehicle operator spells out the locations and destinations, letter by letter. The system confirms the locations by repeating whole words. Once the system has received the current location and destination, the system develops the route and calculates the estimated time. The operator utilizes several specific performance commands, such as "Next", and the system then begins to give segment by segment route directions.

Brief Summary Text (62):
The radio used for the communications subsystem can be radio frequency AM, FM, spread spectrum, microwave, light (infrared, visible, UV) or laser or maser beam (millimeter wave, infrared, visible), or for short distance communications, acoustic or other communications may be employed. The system preferably employs an intelligent transportation system (ITS) or Industrial, Scientific and Medical (ISM) allocated band, such as the 915 MHz, 2.4 MHz or 5.8 GHz band. (The 2.350-2.450 GHz band corresponds to the emission of microwave ovens, and thus the band suffers from potentially significant interference). The 24.125 GHz band, corresponding to K-band police radar, may also be available; however, transmit power in this band is restricted, e.g., less than about 9 mW. The signal may be transmitted through free space or in paths including fiber optics, waveguides, cables or the like. The communication may be short or medium range omnidirectional, line of sight, reflected (optical, radio frequency, retroreflector designs), satellite, secure or non-secure, or other modes of communications between two points, that the application or state-of-the-art may allow. The particular communications methodology is not critical to the invention, although a preferred embodiment employs a spread spectrum microwave transmission.

Brief Summary Text (63):
A number of Dedicated Short Range Communications (DSRC) systems have been proposed or implemented in order to provide communications between vehicles and roadside systems. These DSRC systems traditionally operate in the 900 MHz band for toll collection, while the FCC has recently made available 75 MHz in the 5.850-5.925 GHz range for such purposes, on a co-primary basis with microwave communications, satellite uplinks, government radar, and other uses. However, spectrum is also available in the so-called U-NII band, which encompasses 5.15-5.25 GHz (indoors, 50 mW) and 5.25-5.35 (outdoors, 250 mW). At such frequencies, the preferred semiconductor technology for the radio-frequency circuits is Silicon Germanium, available as a biCMOS heterojunction bipolar transistor process from IBM (CommQuest Technologies Division). Gallium Arsenide processes may also operate in this band. Silicon processes are preferred in the 900 MHz band and below.

Brief Summary Text (67):
In a retroreflector design system, signal to noise ratio is improved by spatial specificity, and typically coherent detection. An interrogation signal is emitted, which is modulated and redirected back toward its source, within a relatively wide range, by a receiver. Thus, while the receiver may be "passive", the return signal has a relatively high amplitude (as compared to non-retroreflective designs under comparable conditions) and the interrogator can spatially discriminate and coherently detect the return signal. Both optical and RF retroreflector systems exist.

Brief Summary Text (68):
In a preferred embodiment, the communications device employs an unlicensed band, such as 900 MHz (902-928 MHz), FRS, 49 MHz, 27 MHz, 2.4-2.5 GHz, 5.4 GHz, 5.8 GHz, etc. Further, in order to provide noise immunity and band capacity, spread spectrum RF techniques are preferred.

Brief Summary Text (78):
Since the communication bandwidth is necessarily limited, and the communications channels subject to noise and crowding, it is often important to prioritize transmissions. It is noted that, without a complete communication of the memory, it is difficult to determine which events a communications partner is aware of, so that an initial communication may include an identification of the partners as well as recent encounters with other partners, to eliminate redundant communications, where possible. Vehicles traveling in the same direction will often be in close proximity longer than vehicles traveling in opposite directions. Further, the information of relevance to a vehicle traveling in the same direction will differ from the information of relevance

to a vehicle traveling in the opposite direction. Thus, in addition to an identification of the communications device, the recent path and proposed path and velocity should also be exchanged. Based on this information, the data is prioritized and sorted, formatted and transmitted. Since the communications channel will likely vary in dependence on distance between partners, the communications protocol may be adaptive, providing increased data rate with decreasing distance, up to the channel capacity. Further, when the vehicles are relatively close, a line-of-sight communications scheme may be implemented, such as infrared (e.g., IRdA), while at larger distances (and/or for all distances) a spread spectrum 915 MHz, 2.4 GHz or 5.825 GHz RF communications scheme implemented.

Brief Summary Text (81):
A central repository of event data may be provided, such as on the Internet or an on-line database. In this case, event information may be administered remotely, and local storage minimized or eliminated. Communications with the central database may be. conducted by cellular telephone, cellular data packet devices (CDPD), PCS, GSM, satellite (Iridium.TM., etc.) or in other communications bands and other communications schemes.

Brief Summary Text (83):
According to one embodiment of the invention, the functions are integrated into a single device, including police radar and LIDAR detectors, user output, memory, central processor, GPS receiver and RF transceiver. Accessory inputs and outputs may also be provided, including means for alphanumeric, graphic (still or motion) or voice message communication between communications devices. Event information is communicated as packets including full event information as well as error correction and detection codes. The packet size is preferably large enough to minimize the impact of communications protocol overhead while small enough to minimize the efficiency loss resulting from full packet retransmissions. For example, a control channel is provided with 256 bit packets, while a set of regular communications channels is provided with 512 bit packets. Event information may span multiple packets or be consolidated within packets. The data is preferably compressed using a dictionary lookup, run length encoding, and/or model-based vector quantization method. Thus, since transceivers will typically be within 2000 meters from each other, relative position may be relayed in an offset format, with a grid size based on GPS precision and required accuracy, e.g., about 50-100 meters. The encoding may be adaptive, based, for example, on stored map information, with information representation density highest on traveled routes and lower in desolate areas. Thus, a sort of differential-corrected positional coding may be established between units.

Detailed Description Text (4):
The communications subsystem 5 is a 900 MHz digital spread spectrum radio transceiver 12, operating unlicensed according to FCC regulations for this type of equipment. The system may alternately or additionally communicate in other unlicensed bands, such as 27 MHz, 49 MHz, FRS band, 2.4-2.5 GHz, 5.4 GHz, 5.8 GHz using various known modulation schemes and data communication protocols. Further, licensed radio bands may also be used, including FM radio sidebands (88-108 MHz), television PRO channel, cellular telephony channels, DECT, PCS and GSM channels, and the like. Likewise, satellite systems 16, 17 may be used to communicate with the mobile communications device 1. Thus, for example, instead of direct communication between mobile units, the existing cellular telephony 10', 10" infrastructure may be used to provide intercell, local, and/or regional communications between units, controlled by cellular telephone switching processors 11', 11". These communications may be given a lower priority than voice communications on the cellular telephone network, and therefore may use otherwise excess bandwidth, thus allowing reduced costs and reduced user fees or subscription rates. Further, this scheme allows use of existing cellular telephones 14, as or instead of an integrated communications subsystem operating according to a different standard. For example, cellular telephones may be present in the vehicle for voice communications purposes, and therefore simultaneously with a system according to the present invention. In this case, the communications device need only have a data communications transceiver for interfacing with a cellular communication device, e.g., AMPS, IS-95, IS-136, CDPD, DECT, GSM and PCS, and need not integrate the radio frequency communication device components. In a variant embodiment, a cellular-type telephone is controlled to operate outside the (AMPS) cellular telephone channels, in the 900 MHz band. It is noted that existing cellar communications system do not

support high bandwidth data communications when using a single channel. On the other hand, the modifications to a digital cellular communications device to allocate a full time division multiplexed (TDM) channel to as single transceiver are theoretically simple, and allow relatively high data rates. Thus, slightly modified transceivers may be employed. Such modified transceivers may also be used for other high bandwidth mobile requirements, such as mobile video-conferencing, and the like.

Detailed Description Text (6):
While the preferred embodiment includes a radio frequency transceiver for transmitting event data and receiving event data, embodiments are also possible which either transmit or receive the relevant data, but not both. For example, regulations may limit certain transmissions or relevant event sensors, e.g., radar detectors in trucks. In these cases, a receive only embodiment may be appropriate. Further, while radio frequency communications are preferred, due to their range, data capacity and availability, optical communications systems 13, e.g., infrared LED's and laser diodes, acoustic communication 15, passive backscatter communications (employing an RF transceiver such as the spread spectrum transceiver 12), and the like may also be employed in conjunction or in substitution of a radio frequency system. Optical communication systems 13 may employ various detectors, including optical homodyne detectors, or other coherent optical detectors, or other types of optical sensors, such as PIDs, CCDs, silicon photodiodes, and the like.

Detailed Description Text (7):
Under some circumstances, a wired link between units may be appropriate. For example, a central database 20 may provide consolidated and reliable data. The relevant portion of the database 20 may be downloaded by telephone through a modem 21, either through a physical connection 23 (e.g., RJ-11 or RJ-12 jack) or through an acoustic coupler 22, through the public switched telephone network, Internet or other network 24, to a database server 25. The memory 4 of the mobile unit may also be uploaded to the central database 20, after processing by the database server 25, during the same connection or session.

Detailed Description Text (9):
The processor 6 analyzes the information stored in memory 4 to provide a prioritized output. Thus, the memory may store information relating to a relatively large number of events, without overwhelming the capacity of a human user or communications partner. Priority may be based on a number of factors, including proximity of a stored location to a sensed location or a spatial-temporal proximity of a stored location to a loci of an itinerary 101, a prospective conjunction 102 of a sensed location with a stored location, a type of event 103, a type of event and a sensed condition associated with the mobile communications device 104, or other factors or a combination of factors. Neural networks, fuzzy logic and/or traditional logic paradigms may also be employed to prioritize the outputs. These logical paradigms are provided in known manner, and, especially in the case of neural network-based systems, a training aspect may be supplied with the system to allow it to adapt to the preferences and capabilities of the user. Thus, for a human user, events which are forthcoming and important are output, while past events and those in the distant future, if at all, are low priority. On the other hand, for communications with other devices, the prioritization is primarily in consideration of the fact that the communication between units may be only short lived; therefore, the data is communicated in order to priority, preferably of the recipient device. In an adaptive device, if the user believes that the information from the device is inappropriate, a simple input is provided, which is later analyzed to alter the information presentation algorithm. Likewise, if an information alert retrospectively turns out to be erroneous is a predictable manner, i.e., relating to a route not taken, the system may internally adjust the algorithm without user input.

Detailed Description Text (15):
Where mobile devices are traveling parallel and at similar speeds, or both are stopped, an extended communications session may be initiated. In this case, the data prioritization will be weighted to completely exchange a public portion of the database, although emphasis will still be placed on immediately forthcoming events, if anticipated. On the other hand, where computed or user-input trajectories indicate a likely brief encounter, the immediate past events are weighted most heavily.

Detailed Description Text (31):
The PDA 30 includes the processing system, including a microprocessor, memory, pre-coded program instructions and data stored in memory, a microprocessor bus for addresses, data, and control, an interrupt bus for interrupt signals, and associated hardware, operates in a conventional manner to receive digital signals, process information, and issue digital signals. A user interface in the PDA includes a visual display or audible output to present signals received from the processing system to a user, a user entry system to issue signals from the user to the processing system. The user interface may include one or more push keys, toggle switches, proximity switches, trackballs, joysticks or pressure sensitive keys, a touch-sensitive display screen, microphones or a combination of any of the above used together or with other similar type user input methods. The PDA sends digital signals representing addresses, data, and commands to the memory device and receives digital signals representing instructions and data from the memory. A PDA interface electrically connects the processing system to a GPS Smart Antenna. If the PDA and GPS are not integrated, a preferred interface comprises a computer-standard low to medium speed serial data interface, such as RS-232, RS-422, or USB, through a cabled interface for connection to the GPS Smart Antenna.

Detailed Description Text (32):
The GPS Smart Antenna system includes a GPS receiver antenna to receive GPS satellite signals from GPS satellite transmitters, a GPS frequency downconverter to downconvert the approximately 1.575 GHz frequency of the L1 GPS satellite signals to a lower frequency (LF) signal that is suitable for digital processing, and to issue the LF to a GPS processor. The GPS processor demodulates and decodes the LF signal and provides location information for at least one of (i) location of the GPS antenna, (ii), GPS satellite pseudoranges between the GPS satellites and the GPS antenna, (iii) rate of change of location of the GPS antenna, (iv) heading of the GPS antenna, and (v) time to a GPS interface. Optionally, the GPS Smart Antenna and GPS processor are differential-ready. An optional input select switch, controlled by the GPS processor upon a request from the PDA, allows a single serial interface to receive either a control signal from the PDA or a DGPS error correction signal from an optional DGPS radiowave receiver. Alternately, a DGPS-type system may be coordinated between multiple mobile receivers, top provide high relative position accuracy, even where the absolute position accuracy is low. Since the event position calculations are based on the relative position frame, the effect is to accurately position the events with respect to the vehicle.

Detailed Description Text (35):
A 900 MHz spread spectrum communications system operates as follows. The RF receiver includes an antenna, low noise amplifier (LNA) with a noise temperature below 80 degrees Kelvin and a helical bandpass filter to cancel the image frequency noise. The filtered signal is then downconverted to an intermediate frequency (IF) of about 70 MHz, which is the result of mixing the filtered received signal with a local oscillator signal of between about 832-858 MHz at about 17 dbm. Of course, other tuning frequencies may be selected, for example, to avoid interference with other equipment. The local oscillator thus operates at about 850 MHz and is locked to a reference of 10.625 MHz. The 70 MHz IF frequency is amplified and filtered by a SAW filter 906 with a bandwidth of 1.5-10 MHz, depending on the data signal bandwidth. The IF is then demodulated to baseband, employing a demodulator using an inverse sequence from the transmitted spread spectrum sequence. Thus, in a frequency hopping embodiment, the demodulator synthesizes a signal having the appropriate frequency sequence. In a direct sequence spread spectrum embodiment, the demodulator provides the appropriate pseudorandom code sequence to demodulate the received signal. Time synchronization may be effected by using the timing functions of the GPS receiver. The demodulated signal is then decoded into messages, which are typically digital bitstreams.

Detailed Description Text (36):
In a 2.4 GHz system, the RF semiconductor technology will typically include gallium arsenide integrated circuits. In a 5.8 GHz system, the RF section semiconductors are preferably silicon germanium. Once demodulated to below about 1 GHz, standard silicon technologies may be employed.

Current US Cross Reference Classification (3):

701/213

CLAIMS:

10. The device according to claim 1, wherein said telecommunications subsystem comprises a wireless communications system.

12. The device according to claim 1, wherein said telecommunications subsystem comprises a spread spectrum radio frequency communications system.

13. The device according to claim 1, wherein said telecommunications subsystem is a radio frequency communications system operating in a band selected from the 900 MHz, 2.4 GHz and 5.8 GHz bands.

14. The device according to claim 1, wherein said telecommunications subsystem is a radio frequency communications system operating in the range 50-450 MHz.

L10: Entry 2 of 37 File: PGPB Apr 24, 2003

DOCUMENT-IDENTIFIER: US 20030078709 A1
TITLE: Method and system for maintaining personalization of user adjustable features

Abstract Paragraph (1):
A system and method are provided for selectively setting one or more variable vehicle operating parameters or features by storing information representative of user/driver preferences on a portable information storage device, and later recalled to automatically adjust the same or other system or device to the same setting(s). Examples of such systems or devices includes seat position, mirrors, radio presets, climate control settings, Web sites, bookmarks, and mobile telephone presets. The personalized "settings" are thus available to be transported and transferred where desired by the possessor of the device.

Current US Classification, US Primary Class/Subclass (1):
701/36

Current US Classification, US Secondary Class/Subclass (1):
701/49

Summary of Invention Paragraph (8):
[0006] In accordance with another aspect of the present invention, a system is provided for selectively setting a variable user preference in a vehicle which includes a portable information storage device arranged to receive and store information representative of at least one user preference, and a vehicle interface connected to an on-board vehicle system capable of being set in accordance with a user preference, wherein the vehicle interface is arranged to receive user preference information from the portable storage device for input to the on-board vehicle system, and the on-board operating system is arranged to set the system based on the received user preference information.

Summary of Invention Paragraph (9):
[0007] In accordance with still another aspect of the present invention, a method is provided for selectively setting a variable user preference in a vehicle which includes determining at least one user preference, storing information representative of the at least one user preference on a portable information storage device, selectively recalling the user preference information stored on the portable information storage device, and setting an on-board vehicle system in accordance with the recalled user preference.

Brief Description of Drawings Paragraph (2):
[0012] FIG. 1 is a block circuit diagram showing a system for maintaining and setting user preferences for a variable operating parameter;

Brief Description of Drawings Paragraph (4):
[0014] FIG. 3 is a flowchart showing the process of maintaining and setting user preferences in accordance with the present invention.

Detail Description Paragraph (2):
[0015] Referring to FIG. 1, the present invention provides a system 10 for maintaining and setting one or more user-defined preferences to at least one operating system. More particularly, a portable personalization storage device 12 is used to download new and/or updated preference information used by a particular operating system to set

one or more variable operating parameters. Once stored on portable storage device 12, the information can be easily transferred as an output signal to the originating control system, or other operating systems to reset the variable operating parameter to the desired user preference.

Detail Description Paragraph (3):
[0016] As shown, portable storage device 12 communicates with a vehicle mounted interface circuit 14 to send and receive the desired user preference information. Interface 14 is connected to at least one vehicle control system 16 having a variable parameter. In one embodiment, vehicle control system 16 can be arranged in accordance with known designs to monitor and store data representing vehicle operating data, such as vehicle mileage and/or engine/vehicle malfunctions. Such operating data can be selectively or automatically sent to the portable storage device for storage therein.

Detail Description Paragraph (5):
[0018] The communication link between the portable storage device 12 and an interface can be wireless, such as via radio, magnetic, optical or acoustic communication circuitry, or wired such as via a suitable set connecting socket. Implementation of such communication circuitry is well understood by one of ordinary skill in the art. In addition, the data can be encrypted/decrypted in accordance with known encryption arrangements to provide a more secure transfer of data. Still further, a suitable authenticating arrangement, such as a thumb print analyzer, can be incorporated into storage device 12, or connected to interface 14 or 18, to allow an operating system to authenticate and verify the identity of the user before implementing the desired preferences or downloading any data.

Detail Description Paragraph (6):
[0019] Vehicle interface 14 can be mounted to a vehicle door, instrument panel, an interior console and/or other location that is conveniently accessed by a user. Interface 18 can be located in a home, office or repair shop as desired. The interfaces communicate with the respective operating systems via a wired or wireless connection.

Detail Description Paragraph (9):
[0022] The vehicle mounted system can include a processor 108, such as microprocessor-based circuit, connected to a touch screen display 110, and audio system 112, and a wireless communication system 114 such as a mobile telephone unit. Processor 108 includes a control arrangement that allows a user to adjust, or customize, one or more operating parameters. Examples of in-vehicle parameter personalization include the following: radio presets; climate settings; seat position; mirror settings; suspension settings; power train settings (including valet settings); cellular telephone presets; MP3 play lists; service/maintenance history and/or schedule; preferred service providers for off-board services; authentication information for e-commerce; security features and vehicle access control; portable digital assistant (PDA) access, reminders and updates; wireless access settings such as cellular phone, ISPs, and links to home/office networks; off-board service providers using dining/entertainment/vehicle information to offer goods and services in a timely fashion; dealership service appointment scheduling based on a user's preferred day/location; and dealership service selected to receive transmission of vehicle status information for diagnosis and parts ordering in preparation of vehicle arrival. Examples of home parameter personalization include audio and video entertainment preferences; temperature/humidity; security; shopping lists; Internet and e-commerce; lighting control; calendar/reminder entries; and address/telephone book entries. Examples of work parameter personalization include scheduling and appointments, and contact information.

Detail Description Paragraph (10):
[0023] Upon receipt and verification/validation (if required) of the user preference data from the portable storage device 12, processor 108 will generate the appropriate control signal(s) to implement the desired preference or setting, or update a system database as required. The processor or interface can be arranged to automatically download any new or modified preference information to the portable storage device 12 upon implementation, at system power down, and/or upon input of a specific user command.

Detail Description Paragraph (11):
[0024] FIG. 3 provides a flowchart showing the overall method of the present invention. As denoted at block 200, one or more variable operating parameters are initialized as user desired preferences. Such initialization can include setting and storing of a particular seat or mirror position, or storing of a particular audio file play list. Once the preference is established, information representative of the preference(s) is downloaded at block 202 to the portable storage device 12 via a suitable interface. At block 204, the information stored on the portable storage device can be selectively transferred to a desired interface, which subsequently communicates the preference information to the appropriate control/operating system.

Detail Description Paragraph (14):
[0027] Therefore, the method and system of the present invention allows systems to be taught and adjusted accordingly to a user's preferences and activities, even if those preferences and activities change over time. The personalization storage device could store information related to the individual in addition to various preferences regarding home, work, and recreation, along with information that defines how the individual accesses the devices and services available. For example, an individual can leave home and in the process of departing, the portable storage device can be manually or transparently loaded with information pertinent to the individual regarding recent home activities that relate to areas of the individual's lifestyle. This could be in the form of music genre and sources that the individual has indicated a preference though recent listening or longer term trend monitoring. Information about recent Internet activity, related to the work place, could be captured and stored in the form of bookmarks. This type of preference and pattern monitoring can be extended to include shopping lists, temperature settings, new sources of entertainment, along with information on the individual's financial institutions, preferred access providers for Internet, e-commerce, service providers. The aspect of personal safety could extend this to include any special medical conditions or histories.

Detail Description Paragraph (16):
[0029] In addition, the personalization storage device can serve as a resource for defining interaction between the vehicle and various mobile devices. A vehicle could provide an environment where scheduled appointments stored on a PDA could be monitored. Visual or audible reminders to the driver could be automatically provided by the vehicle. The vehicle system could display or announce details of the appointment and use tactile or audible responses from the driver regarding the disposition of the appointment. This interaction can be extended, where the vehicle system operates to combine PDA and mobile phone operation so as to initiate a telephone call using appointment or contact information that is stored on the PDA. Additionally, a mobile phone or similar wireless link, a PDA, and the vehicle could be combined using stored preferences so that information from an off-board service provider can be delivered in a timely fashion. This can include information such as the driver's interest in restaurants serving a preferred cuisine. Thus the personalization storage device can operate as a collection point for evolving patterns and interest of individuals. As vehicles develop connections to off-board service providers for roadside assistance, driving directions, and concierge services, the personalization storage device in accordance with the present invention can be used to provide filters whereby off-board content can be provided in a manner acceptable to the individual. The ability of the vehicle to access and update information stored on PDAs, mobile phones and other types of personal electronic devices enables the vehicle to be a conduit between the off-board service providers and these devices.

CLAIMS:

3. The system of claim 1 wherein the means for receiving information and the means for generating an output signal are wireless communication devices.

4. The system of claim 1 wherein the operating parameter comprises a user preference for at least one of the following: radio preset; climate setting; seat position; mirror position; suspension setting; power train setting; cellular telephone preset; digital audio file play list; service/maintenance history or schedule; preferred service provider for an a non-vehicle provided service; authentication information for e-commerce; vehicle access control; calendar reminder; wireless access setting such as

Internet Service Provider (ISP); and vehicle service appointment scheduling based on a user's preferred day/location.

5. A system for selectively setting a variable user preference in a vehicle comprising: a portable information storage device arranged to receive and store information representative of at least one user preference; and a vehicle interface connected to an on-board vehicle system capable of being set in accordance with a user preference, wherein the vehicle interface is arranged to receive user preference information from the portable storage device for input to the on-board vehicle system, and the on-board operating system is arranged to set the system based on the received user preference information.

6. The system of claim 5 further comprising a non-vehicle interface connected to an off-board system, and arranged to receive user preference information from the portable storage device for input to the off-board operating system, wherein the off-board operating system is arranged to set the system based on the received user preference information.

8. The system of claim 5 wherein the user preference comprises at least one of the following: radio preset; climate setting; seat position; mirror position; suspension setting; power train setting; cellular telephone preset; digital audio file play list; service/maintenance history or schedule; preferred service provider for an a non-vehicle provided service; authentication information for e-commerce; vehicle access control; calendar reminder; wireless access setting such as Internet Service Provider (ISP); and vehicle service appointment scheduling based on a user's preferred day/location.

9. A method of selectively setting a variable user preference in a vehicle comprising: determining at least one user preference; storing information representative of the at least one user preference on a portable information storage device; selectively recalling the user preference information stored on the portable information storage device; and setting an on-board vehicle system in accordance with the recalled user preference.

10. The method of claim 9 further comprising setting a non-vehicle system in accordance with the recalled user preference.

11. The method of claim 9 further comprising storing information representative of changes to the user preference on the portable information storage device upon user command.

12. The method of claim 9 further comprising automatically storing information representative of changes to the user preference on the portable information storage device.

13. The method of claim 9 wherein the user preference comprises at least one of the following: radio preset; climate setting; seat position; mirror position; suspension setting; power train setting; cellular telephone preset; digital audio file play list; service/maintenance history or schedule; preferred service provider for an a non-vehicle provided service; authentication information for e-commerce; vehicle access control; calendar reminder; wireless access setting such as Internet Service Provider (ISP); and vehicle service appointment scheduling based on a user's preferred day/location.

16. The storage device of claim 14 wherein the means for receiving information and the means for generating an output signal are wireless communication devices.

17. The storage device of claim 14 wherein the operating parameter comprises a user preference for at least one of the following: radio preset; climate setting; seat position; mirror position; suspension setting; power train setting; cellular telephone preset; digital audio file play list; service/maintenance history or schedule; preferred service provider for an a non-vehicle provided service; authentication information for e-commerce; vehicle access control; calendar reminder; wireless access setting such as Internet Service Provider (ISP); and vehicle service appointment scheduling based on a user's preferred day/location.

WEST

Generate Collection Print

L10: Entry 25 of 37 File: USPT Oct 1, 2002

DOCUMENT-IDENTIFIER: US 6459969 B1
TITLE: Apparatus, program product and method of processing diagnostic data transferred from a host computer to a portable computer

Abstract Text (1):
A diagnostic mechanism for processing diagnostic data transferred from a host computer (e.g., a motor vehicle computer) to a portable computer (e.g., a personal digital assistant (PDA), cellular phone, etc.) An alert is provided based on a comparison in the portable computer of a threshold variable (e.g., generated from a desired threshold value input into the portable computer by the user) and a diagnostic variable (e.g., fuel remaining, service interval, etc.) generated from the diagnostic data. Preferably, the alert includes a calendar entry displayed on a PDA. The alert may further include an alarm at a time-of-day preceding an alarm clock setting of the PDA. Consequently, the user does not have to rely on his/her memory to arise earlier in the morning to fill up with gasoline, for example. Preferably, the PDA receives the diagnostic data in response to being placed in a cradle mounted in a vehicle passenger compartment.

Brief Summary Text (10):
These and other objects of the present invention are achieved by providing an apparatus, program product, and method of processing diagnostic data transferred from a host computer, such as a motor vehicle computer, to a portable computer, such as a personal digital assistant (PDA), cellular phone, etc. A visual and/or audio alert is provided to a user based on a comparison in the portable computer of a threshold variable and a diagnostic variable. The diagnostic variable is based on the diagnostic data transferred to the portable computer from the host computer. The diagnostic variable may be, for example, indicative of an amount of fuel remaining in a motor vehicle, and/or the time elapsed and/or distance driven since a previous maintenance event for a motor vehicle, such as an engine oil change. The present invention can more effectively alert and remind the user of the need for service events, such as refuelling, routine maintenance and unscheduled maintenance of a motor vehicle, for example. Because the portable computer is removable from a motor vehicle, for example, a driver can be reminded of the need for the service event throughout the day, rather than only when he or she is in the motor vehicle as is the case with a conventional fixed installed diagnostic systems.

Brief Summary Text (14):
Preferably, the portable computer receives the diagnostic data from the host computer through a serial link, a parallel link, a modem link, wireless link, etc. The diagnostic data is preferably received in response to placing the portable computer in a cradle, which is preferably mounted in a location that is easily accessed by the user, e.g., a vehicle passenger compartment.

Detailed Description Text (3):
FIG. 1 illustrates an exemplary hardware and software environment for a portable computer 10 consistent with the present invention. For the purposes of the present invention, portable computer 10 may represent practically any type of small portable computer, computer system or other programmable electronic device, including a personal digital assistant (PDA), a cellular phone or related wireless device, a notebook computer, an embedded controller, etc. Examples of common PDAs include the PalmPilot.TM. line available from Palm, Inc., the WorkPad.TM. line available from International Business Machines Corporation, and the Jordana.TM. line available from

Hewlett-Packard Company.

Detailed Description Text (4):
Portable computer 10 may be coupled to one or more computers (e.g., a desktop or PC-based computer, workstations, a PC-based server, a minicomputer, a midrange computer, a mainframe computer, etc.) through a network 12, or may be a stand-alone device in the alternative. For example, network 12 may be a local-area network (LAN), a wide-area network (WAN), a wireless network, and a public network (e.g., the Internet). Moreover, any number of computers and other devices may be networked through the network 12, e.g., multiple servers.

Detailed Description Text (8):
Portable computer 10 also typically receives a number of inputs and outputs for communicating information externally. For interface with a user or operator, portable computer 10 typically includes one or more user input devices 20 (e.g., a keypad, a stylus, a keyboard, a mouse, a trackball, a joystick, a touchpad, and/or a microphone, among others) and one or more displays 22 (e.g., an LCD display panel, a speaker, and/or a CRT monitor, among others). User input device 20 may include a voice recognition system and a microphone to allow activation of various functions by voice command. Similarly, display 22 may include a voice synthesis system and a speaker to allow playback of voice messages. User input device 20 and display 22 may be combined in the form of a touch sensitive screen.

Detailed Description Text (9):
Portable computer 10 includes an I/O port 58 through which diagnostic data is received from a host computer 60 (shown in FIG. 2). Portable computer 10 receives the diagnostic data from the host computer 60 through a wired and/or wireless link. For example, I/O port 58 may represent a serial port (e.g., a RS-232 interface, a RS-422 interface, a RS-423 interface, a universal serial bus (USB) port, a USB HotSync.RTM. port, etc.), a parallel port, a modem port, or a wireless port (e.g., an infrared port, radio frequency (RF) port, etc.).

Detailed Description Text (13):
Typically included among the programs executed by portable computer 10 are a calendar application 42 and an alarm clock application 44. Calendar applications are well known in the art, as are alarm clock applications. The user typically employs calendar application 42 to input calendar information (typically, via user input device 20) and to display the calendar information (typically, via display 22). The calendar information is typically stored in non-volatile memory, e.g., ROM 18, so that the calendar information is retained after the portable computer is turned off. For example, the user may employ calendar application 42 as a scheduling aid, e.g., to avoid missing appointments. The user typically employs alarm clock application 44 to input a time-of-day (typically, via user input device 20) at which an alarm is to be activated (typically, via display 22). The time-of-day information is typically stored in non-volatile memory, e.g., ROM 18, so that the time-of-day information is retained after portable computer 10 is turned off. For example, the user may employ alarm clock application 44 to awaken in the morning at a predetermined time. As discussed in more detail below, portable computer 10 also includes a diagnostic program 46 according to an aspect of the present invention.

Detailed Description Text (14):
Typically, the operating system 30 and various computer software applications, components, programs, objects, modules, etc. (e.g., application programs 40-46) are loaded into memory 16 from non-volatile memory, e.g., ROM 18 and/or a mass storage device, if any. For example, relatively modest small portable computers, such as PDAs, cellular phones and related wireless devices, embedded controllers, etc., typically do not contain a mass storage device and thus the operating system 30 and the various computer software applications, components, programs, objects, modules, etc. are typically loaded into memory 16 from ROM 18 upon power up. On the other hand, relatively robust small portable computers, such as notebook computers, typically contain a mass storage device and thus the operating system 30 and the various computer software applications, components, programs, objects, modules, etc. are typically loaded into memory 16 from the mass storage device and/or ROM 18 upon power up.

Detailed Description Text (19):
Host computer 60 may be coupled to one or more computers (e.g., a desktop or PC-based computer, workstations, a PC-based server, a minicomputer, a midrange computer, a mainframe computer, etc.) through network 64, or may be a stand-alone device in the alternative. For example, network 64 may be a local-area network (LAN), a wide-area network (WAN), a wireless network, and a public network (e.g., the Internet). Moreover, any number of computers and other devices may be networked through network 64, e.g., multiple servers.

Detailed Description Text (22):
For interface with a user or operator, host computer 60 may include one or more user input devices 69 (e.g., a reader device, a keypad, a stylus, a keyboard, a mouse, a trackball, a joystick, a touchpad, and/or a microphone, among others). User input device 69 may be utilized by a service mechanic or technician, for example, to input service information related to the diagnostic data. For example, when a maintenance service is performed (e.g., the engine oil and filter is changed, the chassis is lubricated, the tires rotated, the air filter replaced, the spark plug replaced, the engine coolant replaced, the transmission fluid replaced, the engine belt replaced, the brake pad replaced, etc), a service mechanic or technician may enter the type of service via user input device 69. As an illustrative example, after performing an engine oil and filter change, a service mechanic or technician may pass a token through a reader device that processor 62 associates with engine oil and filter changes. Upon receiving the output of the reader device, processor 62 stores a log entry of the engine oil and filter change in a non-volatile portion of memory 63. In addition to a field identifying the service event, the log entry typically also includes fields identifying the date and/or the mileage of the vehicle when the log entry was stored. Such user input device derived diagnostic data and the data structures thereof are well known in the art.

Detailed Description Text (23):
The diagnostic data from processor 62 of host computer 60 is communicated to portable computer 10 via I/O port 66. Portable computer 10 receives the diagnostic data from the host computer 60 through a wired and/or wireless link. For example, I/O port 66 may represent a serial port (e.g., a RS-232 interface, a RS-422 interface, a RS-423 interface, a universal serial bus (USB) port, a USB HotSync.RTM. port, etc.), a parallel port, a modem port, or a wireless port (e.g., an infrared port, radio frequency (RF) port, etc.).

Detailed Description Text (25):
It should be appreciated that host computer 60 typically includes suitable analog and/or digital interfaces between processor 62 and each of memory 63, network 64, I/O port 66, sensor 68, and user input device 69, as is well known in the art.

Detailed Description Text (28):
Alternatively, portable computer 10 may be directly connected to I/O port 66 of host computer 60 by a cable and/or wireless link in lieu of the cradle 80/connector 82 arrangement. In this alternative, I/O port 66 of host computer 60 is preferably mounted in a location suitable for connection to portable computer 10 via the cable or wireless link. For example, I/O port 66 may be mounted on the vehicle's dashboard and/or center console.

Detailed Description Text (32):
The threshold variable may be a default threshold value provided by diagnostic program 46. The default threshold value is stored in non-volatile memory, e.g. ROM 18. Preferably, however, the threshold variable is generated by diagnostic program 46 based on a desired threshold value input by the user, e.g., through user input device 20.

Detailed Description Text (37):
Preferably, however, the alert comprises a new calendar entry in a viewable calendar displayed on portable computer 10. As is conventional, calendar program 42 displays a calendar on display 22. In this case, diagnostic program 46 causes calendar program 42 to add a new calendar entry to the displayed calendar if the comparison of the threshold variable and the diagnostic variable indicates that a service event is required. The new calendar entry may have a default a default timing (i.e., date and

time-of-day), content and/or duration provided by diagnostic program 46. For example, in a situation where the comparison indicates the need for a refuelling, diagnostic program 46 may cause calendar program 42 to add a new calendar entry of 15 minutes duration to the calendar before a first entry that already exists on the calendar for following day. The content of the new entry may be, for example, "maintain vehicle", "refuel vehicle", etc. The foregoing example is presented for purpose of illustration. Diagnostic program 46 may provide a different default timing, content and/or duration. Moreover, the default timing, content and/or duration generated by diagnostic program 46 may depend on type of service event required. Alternatively, the timing, content and duration of the new calendar entry may be generated by diagnostic program 46 based on input by the user, e.g., through user input device 20. In any event, time is provided in the user's schedule to address the service event.

Detailed Description Text (38):
The alert preferably further comprises an alarm at a time-of-day preceding an alarm clock setting of the portable computer 10. As is conventional, alarm clock program 44 activates an alarm at a time-of-day set by the user through user input device 20. Typically, alarm clock program 44 activates the alarm using display 22, e.g., a speaker thereof. For example, the user may employ alarm clock program 44 to awaken in the morning at a predetermined time, e.g., 6:00 am. In this case, if the comparison of the threshold variable and the diagnostic variable indicates that a service event is required, diagnostic program 46 causes alarm clock program 44 to reset the time-of-day setting. on the date of the new calender entry added to the calendar. The time-of-day setting is reset earlier by an amount of time that may be equal to the duration of the new calendar entry. For example, if the duration of the new calendar entry is 15 minutes and the time-of-day setting is 6:00 am, diagnostic program 46 causes alarm clock program 44 to reset the time-of-day setting to 5:45 am. Consequently, the user does not have to rely on his or her memory to arise earlier in the morning to fill up with gasoline, for example.

Detailed Description Text (44):
At block 404, the user inputs a desired threshold value for each of the custom threshold variables to be monitored. For example, diagnostic program 46 may present a list of service events to be monitored using custom threshold variables on display 22, and the user may use input device 20 to input a desired threshold value for each of service events on the list. Alternatively, diagnostic program 46 may present a query on display 22 for each of the service events to be monitored using custom threshold variables, and the user may use input device 20 to input a desired threshold value for each query individually in succession. In either case, diagnostic program 46 may present on display 22 a suggested value (e.g., the default threshold value) or a suggested range of values for each of the desired threshold values to be input. Alternatively, diagnostic program 46 may give the user no guidance in regard to choosing the desired threshold values to be input. The desired threshold values may be indicative of values (e.g., minimum volume of fuel remaining for alert to be activated, maximum time elapsed since a previous service event for alert to be activated, maximum distance driven since a previous service event for alert to be activated, maximum and/or minimum air pressure of a tire for alert to be activated, etc.) or states (e.g., component failed for alert to be activated). As such, the default and desired threshold values may be a single bit to one or more bytes in length.

Detailed Description Text (47):
FIG. 5 is a flow diagram illustrating steps for transferring diagnostic data from host computer 60 to the portable computer 10, and processing the diagnostic data in portable computer 10. At block 500, the process begins. For example, the user may start the transfer of diagnostic data by placing portable computer 10 in cradle 80. Alternatively, the user may start the transfer of diagnostic data by connecting I/O port 58 of portable computer 10 to I/O port 66 of host computer 60 using a cable or wireless link. In either case, this may commence an initiation protocol in both portable computer 10 and host computer 60.

Detailed Description Text (55):
While this invention has been described with respect to the preferred and alternative embodiments, it will be understood by those skilled in the art that various changes in detail may be made therein without departing from the spirit, scope, and teaching of

the invention. For example, the diagnostic program may determine or refine the threshold variables based on the user's driving habits. In addition, the various inputs provided by the user (e.g., the input of desired threshold values, the selection of service events, the selection of default threshold values, etc.) to the portable computer may be provide by the user to the portable computer through a user input device of the motor vehicle, rather than through the user input device of the portable computer. Similarly, the various outputs provided to the user (e.g., the audio and/or visual alert, the calendar, the list of service events, the status message, etc.) on the display of the portable computer may instead be provided to the user on a display of the motor vehicle, such as a heads-up display, a center console display, an instrument panel display, etc. In such a case, the data transfer between the portable computer and the host computer may be bidirectional. Moreover, additional types of data may be transferred between the portable computer and the host computer, including location information and travel time. In addition, diagnostic and additional types of data may be tranferred between the portable computer and a plurality of host computers, e.g., in a fleet management environment. Accordingly, the herein disclosed invention is to be limited only as specified in the following claims.

Current US Original Classification (1):
701/29

Current US Cross Reference Classification (15):
701/101

Current US Cross Reference Classification (16):
701/114

Current US Cross Reference Classification (17):
701/115

Current US Cross Reference Classification (18):
701/31

Current US Cross Reference Classification (19):
701/32

Current US Cross Reference Classification (20):
701/33

Current US Cross Reference Classification (21):
701/35

CLAIMS:

2. The apparatus as recited in claim 1, further comprising a user input device on a surface of the portable computer, the user input device being connected to the processor, and wherein the program stores the threshold variable in the memory based on a desired threshold value input by the user through the user input device.

11. The apparatus as recited in claim 1, further comprising at least one of a serial, parallel, modem and wireless link between the host computer and the portable computer, and wherein the diagnostic data is received by the portable computer from the host computer through the link.

14. The computer-implemented method as recited in claim 13, further comprising the steps of: inputting a desired threshold value into the portable computer through a user input device on a surface of the portable computer; generating the threshold variable in the portable computer based on the desired threshold value.

20. The program product as recited in claim 19, wherein the program stores the threshold variable in memory in the portable computer based on a desired threshold value input by the user through a user input device.

L10: Entry 20 of 37 File: USPT Apr 22, 2003

DOCUMENT-IDENTIFIER: US 6553308 B1
TITLE: Vehicle-based navigation system with smart map filtering, portable unit home-base registration and multiple navigation system preferential use

Brief Summary Text (3):
Position locators, such as Global Positioning System (GPS) receivers, signal triangulation receivers, compass-based systems, and inertial navigation systems, and the like, have become common in electronic devices, in general, and are particularly used in vehicles. The popularity of such systems is driven by consumer demand, low-cost electronics, and federal legislation which dictates that certain devices, such as cellular telephones, have position-locating capabilities. Position-locating technology is frequently used with mapping programs which provide map data, and the like, to aid in the determination of location and direction. Other related data, such as restaurants, shopping centers, street names, and scenic sites, often accompanies the map data. In addition to cellular telephones and vehicle-based installations, position locators may be included with other portable devices, such as Personal Digital Assistants (PDAs).

Brief Summary Text (4):
The widespread use of devices having position locators has caused certain redundancies to occur. For example, a consumer may have a position locator in his/her cellular telephone, PDA, or the like, and a position locator as a part of a vehicle-based navigation system. Indeed, it is expected that, in the future, vehicles will include a port which holds a portable device, such as a cellular telephone or a PDA, when the vehicle is in use and the portable device is removed when the occupant leaves the vehicle.

Brief Summary Text (5):
Map data from a map database is useful with a position locator in order to aid in the determination of location and/or direction. It is common to reside the map database, in whole or in part, in a vehicle-based storage device. For example, the map database could be provided on a CD ROM device which is useful with a CD reader included with the vehicle-based navigation system. Alternatively, a portion of a database could be downloaded to a local memory such as a flashcard at the beginning of a journey for use with that journey. All such devices require physical manipulation of a data storage media in order to transfer the map database to the vehicle. Such manual manipulation could be eliminated by residing the map database externally of the vehicle and transferring map data and related data to the vehicle on a real-time basis, such as over a communication link, which may be in the form of an RF communication channel. The problem with such systems is that the extent of the data transfer requirements would overwhelm the bandwidth capabilities of commercially available communication links.

Detailed Description Text (2):
Referring now specifically to the drawings, and the illustrative embodiments depicted therein, FIG. 1 describes a method of navigating that utilizes an adaptive system 10 utilizing smart map filtering that includes a vehicle-based navigation system 13 and a communication link 14, preferably a wireless link such as via radio frequency (RF) or microwave telecommunication, between vehicle 12 and a map database 16. In the illustrated embodiment, map database 16 is located remote from vehicle 12. Vehicle 12 is a road transportation vehicle such as an automobile, bus, truck or van. Communication link 14, which is a two-way link, includes communication of map data

from database 16 to vehicle 12, as illustrated at 14a, and communication of information such as speed information from vehicle 12 to database 16, as represented by 14b. Various information can be communicated from vehicle 12 to database 16 and from database 16 to vehicle 12. Such information can include identification of the driver or vehicle (for example, that the vehicle is part of a particular rental fleet or that the driver is a subscriber to the remote service provider of database 16), authorization for the driver or vehicle to access database 16, payment by the driver/vehicle to access or transact with database 16, information on the language/dialect understood by the driver and desired communication from database 16 to vehicle 12, credit information, and the like. Such information communicated from vehicle 12 to remote database 16 can include the geographic location of the vehicle, its velocity and heading while travelling on a road, its altitude above sea level, its inclination, and the type of vehicle and its equipment level so that the data sent from database 16 to vehicle 12 is appropriate for the level/model of equipment/display in the vehicle. Such information communicated from vehicle 12 to remote database 16 can also include a request/preference by the driver for a particular level of map detail/area display/detail density and the like. Map data transferred from database 16 to vehicle 12, such as at 14a, preferably has a particular resolution determined, most preferably, by driver preference and/or by driver authorization and/or by driver experience and/or by driver payment and/or by equipment/display capability in the vehicle and/or by vehicle velocity and/or by vehicle location and/or by vehicle heading and/or by vehicle type or model. Map data resolution establishes the capability of distinguishing individual features of the map segment. In particular, higher resolution map data includes more details, such as individual city streets and landmarks; whereas, coarser resolution map data may include fewer details, such as only thoroughfares, interstate highways, and exit information. The skilled artisan would understand that there is a wide range of information that could be encompassed within the definition of map data resolution. Map data may include related data, such as restaurants, shopping centers, street names, and the like. The display of map data to the driver is thus adaptive to the particular driving condition at the moment of display, and the resolution of the data displayed is a dynamic function of vehicle and personal parameters. Thus, the resolution and/or detail of information displayed to and/or presented to (such as audibly) the driver located within the interior cabin of the vehicle can dynamically adapt in accordance with a vehicle parameter of the vehicle, such as vehicle speed or location or model or equipment type or heading/direction of travel or vehicle authorization, or in accordance with a personal parameter of a person such as of an occupant of the vehicle such as of the driver and/or of a passenger (such as driver/occupant identity, driver/occupant preference for a particular level of information resolution and/or detail such as might be manually input or such as might be stored in a memory in the vehicle, driver authorization, driver credit, driver national identity, driver linguistic, and the like), and in accordance with a driving condition at a particular time and/or at a particular location.

Detailed Description Text (3):
In operation, vehicle-based navigation system 13 conveys speed data, and/or other information as described above, to map database 16. Map database 16 loads map data at a resolution that, preferably, varies inversely with vehicle speed. In particular, if a vehicle is traveling at a relatively high speed, such as along a highway (such as a rural highway), map database 16 would download information along that highway at a relatively coarse resolution. For example, the map data may include exits off of the highway, but not include details of the local streets. It is possible to superimpose related data, such as restaurant information, along each of the exits of the expressway. When vehicle 12 approaches a city or residential area, the location of the vehicle is identified by vehicle-based navigation system 13 (that, for example, can be in-vehicle GPS system that includes a GPS antenna), this is transmitted to the remote database, the vehicle's proximity to an urban center/area is recognized by remote database 16 and, therefore, the proximity of the vehicle to a city/residential zone automatically causes map database 16 to download map data at a finer resolution. Thus, a dynamic map resolution function is provided to the system. Such dynamic map resolution function can be responsive to a variety of vehicle conditions and/or driver preferences/authorizations. These include vehicle location (for example, traveling on a rural highway or on a city/residential highway, whether slowing down to approach an exit on a highway or upon exiting a highway, whether speeding up upon entering a highway via an entry ramp, whether slowing down or speeding up upon entering or

exiting a residential area, and the like). Therefore, for example, the map database may download map data of local streets in an area, for example, a three mile radius around the vehicle, when the vehicle is traveling at a relatively slow speed commensurate with city driving or when the vehicle is stopped. This is based upon a recognition that both the rate of vehicle travel and the detail required vary as a function of vehicle speed, and/or other factors as described above. When, for example, vehicle 12 approaches a city or residential area and slows down, system 10, recognizing the geographic location of the vehicle and recognizing its proximity to a city or residential area, and recognizing that the vehicle has slowed down (system 10 can deduce this by interpretation of GPS data from the vehicle and/or for a speed sensor transducer in the vehicle that provides a signal and/or data to system 10 indicative of the speed of vehicle 12), can cause the download of data from map database 16, and its display to the driver in the vehicle cabin, to be of a finer resolution so as to display map details such as more side streets, intersections, buildings, etc., than when the vehicle had been traveling faster. Likewise, when system 10 recognizes that vehicle 12 is approaching a desired highway ingress or exit ramp, a finer map resolution than previously can be displayed.

Detailed Description Text (6):
Also, and optionally, other vehicle functions can dynamically adapt under control of a system such as system 10 of FIG. 1. For example, a dynamic vehicle function can be provided for a hybrid-powered vehicle (that is equipped with both electric power and non-electric power such as internal combustion power for propulsion). When the in-vehicle navigational system detects that the vehicle is approaching an urban area or is leaving a highway to enter a residential area, the propulsion of the vehicle can be changed from internal combustion drive to electric drive. Also, should an adaptive system such as system 10 estimate that the distance to the desired target destination will exceed the electric power capacity of the electric drive system of the hybrid vehicle, then the drive can be automatically shifted to non-electric drive. Similarly, should the vehicle be equipped with a 2/4-wheel drive system such as an all-wheel drive as known in the art, a system such as system 10 can determine to shift from 4-wheel drive to 2-wheel drive dependent on inputs to system 10 from sensors in the vehicle of vehicle speed, direction, traction, loading, inclination and from GPS-derived information as to vehicle location, heading, the type of road being traveled on, altitude, and the like, as well as other vehicle parameters and personal parameters such as the type of vehicle, experience of the driver, etc. Similarly, the traction of a vehicle and/or the suspension of the vehicle can be dynamically adapted dependent on a vehicle parameter and/or a personal parameter to suit a particular driving condition/location. Thus, for example, and referring to FIG. 1, should vehicle 12 be driving on a road during a snow/ice condition, then database 16, knowing the geographic location of vehicle 12 by wireless communication from vehicle 12 to database 16 of the vehicle's instantaneous location as determined by in-vehicle navigational system 13, and database 16 knowing the local weather conditions at that location (or, alternately, database 16 linking to a data source to provide this local weather information) and recognizing that local icing conditions exist, database 16 can communicate back via wireless communication (via an RF link or a microwave link or a radio link) control data to vehicle 12 to set a parameter of the vehicle, such as traction, suspension, tire pressure, or the like, to a condition that best suits driving at that location and experiencing that particular weather condition.

Detailed Description Text (8):
The present invention further includes a dynamic traffic control function wherein the geographic position and heading of a plurality of vehicles is dynamically provided to a traffic control center, and based on the information provided by wireless communication by, preferably, many hundreds to thousands of vehicles to the traffic control center regarding traffic location and individual vehicle direction/travel intent, then traffic control elements such as traffic lights, speed limits, traffic signs, and the like, can be set dynamically in accordance with dynamic traffic conditions in a locality. Thus, for example, data from such as system 10 of FIG. 1 could be wirelessly communicated to a traffic control center, and vehicle 12, in turn, could receive data back from the traffic control center (via wireless communication) updating on local traffic conditions and/or causing database 16 to display in vehicle 12 the least traffic-congested route to the destination desired by the driver/in the local area of the vehicle.

Detailed Description Text (9):
Also, emergency vehicles such as police cars, ambulances, fire trucks, and the like, can communicate via wireless communication to a vehicle such as vehicle 12 causing an alert (such as an audible alert or a visual alert such as an icon or display) being set off within the vehicle cabin alerting the driver to make way for the emergency vehicle. Also, the location of the emergency site can be communicated to database 16, and any route displayed therefrom in the vehicle cabin can be adjusted to guide the driver of vehicle 12 away from the location of the emergency event, if in his/her line of intended travel. Thus, vehicle 12 is guided away from the emergency event, thus avoiding potential traffic congestion for vehicle 12, and potential traffic impediment for the emergency vehicle seeking to reach the emergency event.

Detailed Description Text (10):
Also, database 16 such as in system 10 can automatically alert the driver when approaching a train crossing, and so help prevent train-vehicle collisions. Further, most if not all locomotives are equipped with a GPS system and they are in wireless communication with a train system control center. This present invention includes a dynamic train crossing control system which, upon identifying that a train is approaching a particular train rail/road crossing that crosses a particular road, communicates the imminent approach to (or crossing of) that particular road/rail track crossing by a train (by wireless telecommunication) to database 16 (or alternately, directly to vehicle 12 such as via an ONSTAR.TM. link to that vehicle) which, in turn, alerts the driver of the train crossing event should system 10 determine that vehicle 12 is on a route that will intersect with that train as it crosses that particular train crossing. By a display and/or alarm in vehicle 12 being alerted by system 10 (such as by sounding an audible alert or providing a visual alert such as a warning display in vehicle 12, such as at interior mirror assembly 19) of the train rail/road crossing event that will imminently occur or that is actually occurring in the path of vehicle 12, the driver of vehicle 12 can take appropriate action to avoid any collision. Should the driver of vehicle 12 fail to take heed of the train approaching the crossing in the path of vehicle 12, then this can be communicated back to the train (by wireless communication), providing a potential opportunity for the train driver to take action to avoid a train-vehicle collision.

Detailed Description Text (11):
FIG. 5 illustrates a dynamic train crossing control system 50 of the present invention. Train 54 (that is equipped with a navigational system 56, preferably a GPS system, that can identify the location, direction and/or speed of train 54) is traveling in direction 76 towards rail/road crossing 52 on rail track 62. Vehicle 58 (that is equipped with a navigational system 60, preferably a GPS system, that can identify the location, direction and/or speed of vehicle 58) is traveling in direction 78, also towards rail/road crossing 52. As train 54 approaches crossing 52, a train locator signal 66 (derived from navigational system 56 that functions as a position locator for the train) is wirelessly transmitted to a train control center 68. Train control center 68, in turn, transmits an alert signal 70 to telematic center 72 (that, for example, is an ONSTAR.TM. service provider or a Web site or a computer site, or an intelligent highway control center or a traffic control center), preferably by wireless transmission. As vehicle 58 approaches crossing 52, a vehicle locator signal 79 (derived from navigational system 60 that functions as a position locator for the vehicle) is wirelessly transmitted to telematic center 72. Telematic center 72, knowing of the imminent arrival of train 54 at crossing 52, transmits by wireless communication a train approach signal 74 to vehicle 58 in order to alert the driver of the vehicle that a train is approaching the rail/road crossing ahead. A signal device, such as an audible alarm or a visual display/icon, is activated in the vehicle to alert the driver to the situation. Also, telematic center 72, optionally, can transmit a signal 80 to train control center 68 alerting it to the imminent approach of vehicle 58 to crossing 52. A signal 76 is thereupon transmitted from train control center 68 to train 54 to alert the train driver of the approach of a vehicle to the crossing ahead.

Detailed Description Text (14):
In another vehicle-based navigation system 20 (FIGS. 2a and 2b), a vehicle 22 includes a navigation system 24, such as a GPS. A portable device 26 is removably coupled with vehicle 22 through a communication port 28. Coupling of portable device 26 with vehicle 22 is preferably by radio-frequency link, infra-red link, radio link or

satellite link, or any combination thereof. Portable device 26 additionally includes a position locator 30 which establishes the position of portable device 26. For example portable device 26 may comprise a cellular hand-held mobile phone that is equipped with a position locator circuit/feature that identifies the geographical location from which a phone call or communication link is being made using that cellular phone. When portable device 26 is removed from port 28, such as when the occupant leaves vehicle 22, an optional communication link 32 provides data exchanged between portable unit 26 in vehicle 22 in a manner which will be described below. Examples of docking techniques and dockable accessories and of portable devices are disclosed in commonly assigned U.S. patent application Ser. No. 09/449,121 filed Nov. 24, 1999, by Hutzel et al. for a REARVIEW MIRROR ASSEMBLY WITH UTILITY FUNCTIONS, now U.S. Pat. No. 6,428,172, patent application Ser. No. 60/199,676, filed Apr. 21, 2000, by McCarthy et al. for a VEHICLE MIRROR ASSEMBLY COMMUNICATING WIRELESSLY WITH VEHICLE ACCESSORIES AND OCCUPANTS (Attorney Docket No. DON01 P-818), and patent application Ser. No. 09/466,010 filed Dec. 17, 1999, by DeLine et al. for an INTERIOR REARVIEW MIRROR SOUND PROCESSING SYSTEM, now U.S. Pat. No. 6,420,975, the disclosures of which are all hereby incorporated herein by reference.

Detailed Description Text (15):
In operation, while portable unit 26 is engaged with port 28, such as during operation of the vehicle, the position of vehicle 22 may be stored (such as in an electronic digital memory) within portable unit 26 when portable unit 26 is disconnected from port 28. Thereafter, the location of vehicle 22 is retained in portable unit 26 as a "home-base." This allows the user to always be able to locate his/her vehicle when away from the vehicle. Thus, the present invention includes providing a vehicle location identifier function that allows the driver find the location of the vehicle when it is parked, and when the driver is returning to the parked vehicle. This function is especially useful in congested areas, such as urban areas, parking lots, and the like. If portable unit 26 is coupled with vehicle 22 through a communication link 32 (such as a wireless communication such as telematic links such as are described in commonly assigned U.S. patent application Ser. No. 09/449,121 filed Nov. 24, 1999, by Hutzel et al. for a REARVIEW MIRROR ASSEMBLY WITH UTILITY FUNCTIONS, now U.S. Pat. No. 6,428,172, and patent application Ser. No. 09/466,010 filed Dec. 17, 1999, by DeLine et al. for an INTERIOR REARVIEW MIRROR SOUND PROCESSING SYSTEM, now U.S. Pat. No. 6,420,975, the disclosures of which are hereby incorporated herein by reference), then vehicle-based navigation system 24 can communicate map data over communication link 32 to portable unit 26. Communication link 32 could be a radio-link, such as that provided by a cellular telephone, such as the radio-link feature supplied by the Nextel system. In this manner, portable unit 26 can receive high resolution information, such as map data from vehicle 22, and such received information can be displayed to the holder of the portable unit via a display device or via voice generation.

Detailed Description Text (16):
If combined with navigation system 10, navigation system 20 may operate as follows. When vehicle 22 becomes stopped, map data downloaded from map database 16 will typically be of a fine resolution in the area immediately surrounding vehicle 22, such as, for example, a three mile radius around the vehicle. This data may then be communicated to portable unit 26 through port 28. Therefore, as the user removes portable unit 26 from port 28 and travels from the vehicle, the user will have fine resolution map data in an area typically within walking distance of vehicle 22. Should, however, the user get on a mass transit mode of transportation, the user may travel outside of the range of map data loaded in portable unit 26. When the user exits the mass transit, new high resolution map data can be downloaded to vehicle 22 over communication link 14a from map database 16 and over communication link 32 to portable unit 26. Alternatively, if the map database resides in vehicle 22, then the fine resolution data could be communicated from the vehicle-based database over communication channel 32 to portable unit 26. Navigation system 20 facilitates communication between portable unit 26 and vehicle 22 in a manner which minimizes bandwidth requirements, thereby enhancing battery life of the portable device. In addition, the communication between the vehicle and the portable device can be used for additional features, such as monitoring the security of the vehicle while parked. For example, portable device 26 can include an audible and/or visible alarm that that alerts if the vehicle security system has been activated. The user of portable device 26, typically the intended driver of the parked vehicle, can then choose to either

remotely deactivate the vehicle alarm by wireless communication back to the parked vehicle, or can choose to take an action in response to the security alert broadcast wirelessly from the parked vehicle to the mobile portable device 26 (which can be a personal digital assistant, a portable computer, a laptop computer, a palm computer, a notebook computer, a pager, a cellular phone, or the like), such as contacting a security service or the police. Such portable devices preferably incorporate digital computing technology. Optionally, the user of the portable device can choose to broadcast wirelessly back to the parked vehicle a disable code that disables operation of the vehicle, and so help obviate theft. In addition to map database information, navigation system 20 can download related data to portable unit 26 over communication channel 32, such as scenic site information, restaurant information, shopping information, street names, and the like.

Detailed Description Text (19):
Also, the map database, such as map base 16 shown in FIG. 1, and which is accessed by wireless communication from a vehicle, such as vehicle 12 of FIG. 1, can be of various types. For example, it can be part of a telematic service provided by or accessed via a vehicular wireless communication system such as ONSTAR.TM. from General Motors of Detroit, Mich., or RESCU.TM. from Ford Motor Company of Detroit, Mich. The map database may be a site on the World-Wide Web, accessed from the vehicle via two-way telecommunication with (and linkage to) the INTERNET, such a by telematic access from the vehicle to a map direction Web site such as is at www.mapguest.com. Optionally, the map database can be stored on a dedicated computer, such as a company computer or a personal computer, and with telematic access thereto being provided to and from the vehicle.

Detailed Description Text (21):
Also, the interior mirror assembly can include various accessories or functions such as in commonly assigned U.S. Pat. Nos. 5,959,367 and 6,000,823, the disclosures of which are hereby incorporated herein by reference. The in-vehicle components such as in system 10 of FIG. 1 can be linked by wired connection or by wireless connection such as IR wireless communication or RF communication [such as using the BLUETOOTH protocol such as is available from Motorola of Schaumberg, Ill.], and as disclosed in provisional patent application Ser. No. 60/187,960 filed Mar. 9, 2000, by McCarthy et al. for a COMPLETE MIRROR-BASED GLOBAL-POSITIONING SYSTEM (GPS) NAVIGATION SOLUTION, the disclosure of which is hereby incorporated herein by reference. Preferably, linkage of the in-vehicle components of system 10 is at least partially, and preferably substantially, via linkage to a vehicle bus system or network such as a CAN or LIN system such as disclosed in commonly assigned U.S. patent application Ser. No. 60/196,577, filed Mar. 31, 2000, by Lynam et al. for a DIGITAL ELECTROCHROMIC CIRCUIT WITH A VEHICLE NETWORK SUCH AS A CAR AREA NETWORK OR A LOCAL INTERCONNECT NETWORK (Attorney Docket No. DON01 P-814), the disclosure of which is hereby incorporated herein by reference.

Detailed Description Text (25):
Vehicle 12 as shown in FIG. 1 preferably includes a voice acquisition system, a voice recognition system and/or a voice generation system, such as are described in application Ser. No. 09/466,010 filed Dec. 17, 1999, by DeLine et al. for an INTERIOR REARVIEW MIRROR SOUND PROCESSING SYSTEM, now U.S. Pat. No. 6,420,975, and application Ser. No. 09/396,179 filed Sep. 14, 1999, now U.S. Pat. No. 6,278,377, Ser. No. 09/382,720 filed Aug. 25, 1999, now U.S. Pat. No. 6,243,003, Ser. No. 09/449,121 filed Nov. 24, 1999, now U.S. Pat. No. 6,428,172, Ser. No. 09/433,467 filed Nov. 4, 1999, now U.S. Pat. No. 6,326,613, Ser. No. 09/448,700 filed Nov. 24, 1999, now U.S. Pat. No. 6,329,925, the disclosures of which are hereby incorporated herein by reference. Preferably, mirror 19 includes a digital sound processing system comprising multiple microphones and a digital signal processor. Most preferably, vehicle 12 is also equipped with a vehicular language translation system. Such a language translation system is capable of receiving data intended for display or play back in a particular language (for example, English), and converting this data to a different language (for example, German), and displaying and/or audibly voice generating that data in that different language. Thus, for example, a German-speaking tourist renting a vehicle in Chicago, USA could have the data from a map database (or any other source of information/data) translated from English to German by that tourist activating the German translation function of the language translation system in the vehicle. Preferably, the language translation system in the vehicle includes a wireless

telecommunication link to a translation service remote from the vehicle. Preferably, at least the microphone of the language translation system is mounted at, on, within or local to the interior rearview mirror assembly of the vehicle. Most preferably, the voice acquisition for the vehicular language translation system is located at the interior mirror assembly, such as is disclosed in U.S. patent application Ser. No. 09/466,010 filed Dec. 17, 1999, by DeLine et al. for an INTERIOR REARVIEW MIRROR SOUND PROCESSING SYSTEM, now U.S. Pat. No. 6,420,975, the entire disclosure of which is hereby incorporated by reference herein. Thus, most preferably, the vehicle-based input to such a system and/or other in-vehicle components useful in the present invention are located at, within or on the interior rearview mirror assembly (which may be of the prismatic-type or of the electro-optic type, preferably an electrochromic interior rearview mirror assembly). Preferred modes of data input to an interior mirror assembly (useful with any of the systems of the present invention) are disclosed in commonly assigned applications Ser. No. 60/192,721, filed Mar. 27, 2000, by Lynam et al. for an INTERFACE AUTOMOTIVE REAR VISION SYSTEM (Attorney Docket No. DON01 P-815) and Ser. No. 09/448,700 filed Nov. 24, 1999, by Skiver et al. for a REARVIEW MIRROR ASSEMBLY WITH ADDED FEATURE MODULAR DISPLAY, now U.S. Pat. No. 6,329,925, the disclosures of which are hereby incorporated herein by reference.

Detailed Description Text (26):
Also, the present invention includes an adaptive vehicular telecommunication system that includes providing a position locator and remote data source (and with the remote data source such as a map database provided from a site external to the vehicle and in wireless communication with the vehicle), determining at least one of a vehicle parameter and a personal parameter, and transferring data from the remote data source to the vehicle at a resolution that is a function of at least one of a vehicle parameter and a personal parameter. Also, the present invention includes an adaptive vehicular telecommunication system that includes providing a position locator and remote data source (and with the remote data source such as a map database provided from a site external to the vehicle and in wireless communication with the vehicle), determining at least one of a vehicle parameter and a personal parameter, transferring data from the remote data source to the vehicle, and displaying that transferred data within that vehicle at a resolution that is a function of at least one of a vehicle parameter and a personal parameter. The adaptive vehicular telecommunication system of the present invention displays data within the vehicle such as, most preferably, at an interior mirror assembly-mounted display; or at a display mounted at, on, within or proximate to the instrument panel of the vehicle or mounted at a roof portion of the vehicle such as a header console; or as a heads-up display, preferably a heads-up video display viewable by looking forward through the front windshield of the vehicle. The adaptive vehicular telecommunication system of the present invention displays the data within the vehicle with a display characteristic (such as display resolution, display detail, display brightness, and the like) that is a function of at least a navigational characteristic of the vehicle (such as the geographic location of the vehicle or the directional heading of the vehicle or the altitude of the vehicle) as determined by an in-vehicle navigation system (preferably a GPS system).

Detailed Description Text (27):
Preferably, the adaptive vehicular telecommunication system of the present invention displays the data within the vehicle with a display characteristic (such as display resolution, display detail, display brightness, and the like) that is a function of at least a navigational characteristic of the vehicle (such as the geographic location of the vehicle or the directional heading of the vehicle or the altitude of the vehicle) as determined by an in-vehicle navigation system (preferably a GPS system), and includes a two-way wireless telecommunication link to a data source (such as an ONSTAR.TM. telematic service or a Web site or an external computer or a traffic control center or a train system control center or a PDA or a cellular phone or a security or child monitoring camera-based video monitoring system such as in a home, office or factory) that is remote, distant from and external to the vehicle, and with that remote data source at least partially providing the data displayed in the vehicle (or presented in the vehicle such as by audible voice generation) by wireless communication from the data source. The in-vehicle display of data by the adaptive vehicular telecommunication system of the present invention is dynamically responsive to a vehicle parameter and/or to a personal parameter.

Current US Original Classification (1):

701/208

Current US Cross Reference Classification (2):
701/200

CLAIMS:

1. A method of navigating when driving a vehicle, comprising: providing a position locator and a display in the vehicle; providing a map database; providing a vehicle-based navigation system and a communication link, said communication link comprising a wireless communication link between the vehicle and the map database, said map database being located exteriorly of and remote from the vehicle when the vehicle is traveling, said communication link providing information to said map database chosen from: (1) driver information, said driver information including at least one of driver preference information, driver experience information, the driver's language information, the driver's identity information, the driver's national identity information, and driver authorization information; and (2) vehicle information, said vehicle information including at least one of the vehicle geographic location information, the speed of the vehicle information, the vehicle heading information, the vehicle altitude information, the vehicle inclination information, the vehicle type information, and the vehicle equipment information; determining a position of the vehicle with said position locator; determining at least one of a vehicle parameter and a personal parameter based on said information; and transferring map data from said map database to the vehicle, and said display displaying at least a portion of the transferred map data at a resolution that dynamically varies as a function of said at least one of a vehicle parameter and a personal parameter, said portion of the transferred map data being associated with the position of the vehicle.

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L10: Entry 1 of 37 File: PGPB Apr 24, 2003

DOCUMENT-IDENTIFIER: US 20030078726 A1
TITLE: Communication navigation system and method, program storage device and computer data signal embodied in carrier wave

Current US Classification, US Primary Class/Subclass (1):
701/209

Current US Classification, US Secondary Class/Subclass (2):
701/202

Summary of Invention Paragraph (11):
[0010] On that account, various communication navigation systems are suggested in order to improve such increase of the scale of the processing and that of the apparatus. In these communication navigation systems, the map database information is obtained and provided through two-way wireless communication between a communication center apparatus on a communication network and a communication navigation terminal mounted on a vehicle (e.g. refer to the examples of Japanese Patent Application Laying Open NO. Hei 7-262493 "a system for distributing map information for a movable body" and Japanese Patent Application Laying Open NO. Hei 10-96644 "a system for guiding a moving route").

Summary of Invention Paragraph (15):
[0014] It is impossible to have a service of navigation in the area that an electric wave cannot arrive in with a sufficient electric field intensity to use a wireless device. Usually, in this situation, there is no problem while driving along a route of a preset drive plan, however, in the case of deviating from the route by some reasons, if the area is out of a service area, it becomes impossible to obtain information to return the original route. For example, if it is impossible to transmit and receive the necessary information for a route search, then it is impossible to perform a reroute search on the side of the communication navigation terminal. Alternatively, if it is impossible to receive information on a current position or the like, then it is impossible to perform the reroute search on the side of the communication center apparatus. Moreover, if it is impossible to transmit and receive the search result, there is no meaning to perform the reroute search. Particularly, a movable body communication network is placed along expressways and main highways in many cases, and once the movable body deviates from this road, it is impossible to communicate, which is sufficiently assumed. Moreover, in the current situation, the infrastructure of a communication device such as a cellular phone or the like is not sufficiently promoted in mountain areas, and even in the future, it is difficult to think of the possibility to promote the infrastructure to cover all districts including depopulated areas in the view of economic investment efficiency.

Summary of Invention Paragraph (19):
[0017] The above object of the present invention can be achieved by a communication navigation system provided with: a communication center apparatus; and a communication navigation terminal, both of which transmit and receive information by a two-way communication through a communication network, (i) the communication center apparatus provided with: a map database for storing therein map database information including information for a route search, which enables the route search from a current position of a movable body to a destination by a predetermined algorithm; a search device for searching, by the predetermined algorithm, for a route heading to the destination from the current position, on the basis of the map database information including the

information for the route search, from the destination and the current position received through the communication network; and a center side wireless device for wirelessly transmitting route information indicating the searched route through the communication network, (ii) the communication navigation terminal provided with: a measurement device for measuring the current position; a terminal side wireless device for transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation device for selectively performing a route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

Summary of Invention Paragraph (20):
[0018] According to the communication navigation system of the present invention, the communication center apparatus is provided with the map database. This map database stores large-scale map database information including the information for the route search such as the above-described node information, link information, or the like, which enables a search for an optimum route from an origin to a destination by a predetermined mathematical algorithm such as Dijkstra's algorithm and so on. When the communication navigation is performed, the route search request information indicating an origin and a destination may be firstly transmitted by a user communication terminal such as a cellular phone, a mobile, a facsimile, a personal computer, or the like at a user's home, a communication navigation terminal, which is carried by a user or which is mounted on a user's movable body, and so on. Secondly, the communication center apparatus receives this information through the communication network. Then, at the communication center apparatus, the search device searches for the optimum route with respect to the received route search request information with the predetermined algorithm such as Dijkstra's algorithm or the like on the basis of the information for the route search included in the above-described map database information. Then, the center side wireless device wirelessly transmits, through the communication network, the searched route information, including the information on a plurality of guidance positions, for example, such as a branching point, an intersection, or the like, located on this searched route. In this specification, the "guidance position" is referred to a position at which it is preferable to perform the route navigation or the route guidance of some kind in order to drive on a predetermined route. Moreover, the "information on guidance positions" is information that allows the specification of locations of the guidance positions somehow, such as coordinates information that indicates absolute locations of the guidance positions, coordinates information that indicates relative locations with the absolute location as a standard, and the like.

Summary of Invention Paragraph (21):
[0019] On the side of the communication navigation terminal, the terminal side wireless device receives the route information indicating the optimum route from the current position to the destination, which has been transmitted from the center side wireless device of the communication center apparatus. This route information is recorded in the communication navigation terminal, and it is read out and displayed when the route navigation device performs the route navigation. Map information for display used in this case can be obtained such that when the optimum route is presented from the communication center apparatus, the related map information within a predetermined range is transmitted at the same time. In this case, the map information for display can decrease in the volume of data to be transmitted and received, by cutting the related information within a predetermined range from the map database information including the information for the route search, whose data volume is huge, and transmitting it, and thus a recording device of the communication navigation terminal may be small. Alternatively, if the simple map information having small data volume is available, the map information may be stored in a storing device such as a DVD or the like equipped for the communication navigation terminal, and a related part may be read out from this.

Summary of Invention Paragraph (23):
[0021] Especially, here, the route navigation device, which is provided for the communication navigation terminal, selectively performs the route navigation on the optimum route, on the basis of the measured current position and the route information indicating the optimum route from the current position to the destination, which has been received by the terminal side wireless device as described above. For example, a

current position mark of the self-car is displayed on the optimum route which is highlight-displayed on a map, and the guidance information is displayed or audio-outputted at each intersection on the optimum route. Then, the route navigation on the optimum route in this kind is continued, as long as the self-car keeps, a normal drive on the route.

Summary of Invention Paragraph (35):
[0033] In another aspect of the communication navigation system of the present invention, the route search is required of the communication center apparatus by the terminal wireless device within a service area of the communication navigation system, in which it is possible to transmit and receive the information through the communication network, in case that the movable body is not on the searched route.

Summary of Invention Paragraph (36):
[0034] According to this aspect, in case that the movable body is not on the searched route, the terminal side wireless device requires the route search of the communication center apparatus within the service area. Therefore, in response to this, the reroute search is performed by the search device on the side of the communication center apparatus and the route information is generated. Then, this is received at the communication navigation terminal and the route navigation is performed. Namely, if within the service area, the reroute search with a high accuracy is performed through the communication network by making the best use of the benefit of the communication navigation system, which is useful.

Summary of Invention Paragraph (39):
[0037] In another aspect of the communication navigation system of the present invention, the judgment device judges on the basis of an electric field intensity of an electric wave received by the terminal side wireless device.

Summary of Invention Paragraph (40):
[0038] According to this aspect, if the electric field intensity level of the electric wave received by the terminal side wireless device of the communication navigation terminal is low and information cannot be received in sufficient quality, it is judged out of the service area of the communication navigation. If judged out of the service area, it is possible to automatically reflect the fact to the choice at the route navigation device in case of deviating from the route later, or it is possible to inform the fact of a driver by displaying it on the display device of the communication navigation terminal, alarming with a speaker, or the like.

Summary of Invention Paragraph (42):
[0040] According to this aspect, the communication navigation terminal judges whether the current position is within or out of the service area by emitting a signal for checking to the communication center apparatus, receiving and analyzing a signal for replying to be transmitted, and judging whether or not the communication quality is sufficient. For example, it transmits predetermined data and has the communication center apparatus transmitted the data back. After receiving the data, it compares the transmitted data with the received data to obtain the frequency of errors and judges whether the current position is within or out of the service area. In this manner, it is possible to judge whether or not it is possible to have the service in the total communication system including the condition of the communication center apparatus in addition to the condition of the wireless communication network, which becomes a communication medium.

Summary of Invention Paragraph (44):
[0042] According to this aspect, the terminal side wireless device of the communication navigation terminal receives a carrier wave of a wireless line at predetermined time intervals and monitors its electric field intensity while the movable body is driving. If the electric field intensity level is equal to or lower than a predetermined level, it is judged out of the service area.

Summary of Invention Paragraph (46):
[0044] According to this aspect, the terminal side wireless device of the communication navigation terminal receives a carrier wave of a wireless line and monitors its electric field intensity every time the movable body drives a predetermined distance while the movable body is driving. If the electric field

intensity level is equal to or lower than a predetermined level, it is judged out of the service area. According to this method, it becomes possible to omit the operation of judgment regardless of the case of rarely driving because of traffic congestion. Moreover, it becomes possible to sufficiently understand the first driving distance after the movable body goes out of the service area.

Summary of Invention Paragraph (47):
[0045] In another aspect of the communication navigation system of the present invention, the communication navigation terminal is further provided with a choice device for choosing whether to require the route search of the communication center apparatus by the terminal side wireless device or to perform the simple navigation by the route navigation device in case that the movable body is not on the searched route.

Summary of Invention Paragraph (65):
[0063] According to this aspect, the user communication terminal, such as a personal computer, a facsimile, a mobile, a cellar phone, and the like, which are installed at the user's home, transmits the route search request information, and the center side wireless device receives this route search request information. Since the route that meets the condition presented by the user is searched for on the basis of this information at the communication center apparatus, it becomes possible to request the route search before the user actually starts moving. The searched route information may be transmitted or transported to the communication navigation terminal through the wireless communication device directly from the communication center apparatus. It may also be transported to the communication navigation terminal after stored in the user communication terminal once. The transportation to the communication navigation terminal from the user communication terminal may be performed with a wireless device or through a memory medium such as a magnetic record medium, a semiconductor memory, or the like.

Summary of Invention Paragraph (68):
[0066] The above object of the present invention can be achieved by a first program storage device readable by a computer for tangibly embodying a program of instructions executable by the computer to perform method processes of communication navigation at the communication navigation terminal in the above-described communication navigation system (including its various aspects), more concretely, at various component devices, such as the measurement device, the terminal side wireless device, the route navigation device, and the like, which constitute the communication navigation terminal of the present invention.

Summary of Invention Paragraph (70):
[0068] The above object of the present invention can be also achieved by a first computer data signal embodied in a carrier wave and representing a series of instructions which cause a computer to perform method processes of communication navigation at the communication navigation terminal in the above-described communication navigation system (including its various aspects), more concretely, at various component devices, such as the measurement device, the terminal side wireless device, the route navigation device, and the like, which constitute the communication navigation terminal of the present invention.

Summary of Invention Paragraph (72):
[0070] The above object of the present invention can be achieved by a second program storage device readable by a computer for tangibly embodying a program of instructions executable by the computer to perform method processes of communication navigation in the above described communication navigation system (including its various aspects), more concretely, on one hand, at various constitutional elements, such as the map database, the search device, the center side wireless device, and the like, which constitute the communication center apparatus, and on the other hand, at various constitutional elements, such as the measurement device, the terminal side wireless device, the route navigation device, and the like, which constitute the communication navigation terminal of the present invention.

Summary of Invention Paragraph (74):
[0072] The above object of the present invention can be achieved by a second computer data signal embodied in a carrier wave and representing a series of instructions which

cause a computer to perform method processes of communication navigation in the above described communication navigation system (including its various aspects), more concretely, on one hand, at various constitutional elements, such as the map database, the search device, the center side wireless device, and the like, which constitute the communication center apparatus, and on the other hand, at various constitutional elements, such as the measurement device, the terminal side wireless device, the route navigation device, and the like, which constitute the communication navigation terminal.

Summary of Invention Paragraph (76):
[0074] Incidentally, the above object of the present invention can be achieved by another program storage device readable by a computer for tangibly embodying a program of instructions executable by the computer to perform method processes of communication navigation at a communication center apparatus included in the above described communication navigation system of the present invention (including its various aspects), more concretely, at various constitutional elements, such as the map database, the search device, the center side wireless device, and the like, which constitute the communication center apparatus.

Summary of Invention Paragraph (77):
[0075] The above object of the present invention can be achieved by another computer data signal embodied in a carrier wave and representing a series of instructions which cause a computer to perform method processes of communication navigation at the communication center apparatus included in the above described communication navigation system of the present invention (including its various aspects), more concretely, at various constitutional elements, such as the map database, the search device, the center side wireless device, and the like, which constitute the communication center apparatus.

Summary of Invention Paragraph (78):
[0076] The above object of the present invention can be achieved by a communication navigation method executed in a communication navigation system comprising a communication center apparatus; and a communication navigation terminal, both of which transmit and receive information by a two-way communication through a communication network, the method comprising: (i) at the communication center apparatus, a search process of searching, by a predetermined algorithm, for a route heading to a destination from a current position, from the destination and the current position received through the communication network, on the basis of a map database for storing therein map database information including information for a route search, which enables the route search from the current position of a movable body to the destination by the predetermined algorithm; and a center side wireless process of wirelessly transmitting route information indicating the searched route through the communication network, and (ii) at the communication navigation terminal, a measurement process of measuring the current position; a terminal side wireless process of transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation process of selectively performing a route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

Detail Description Paragraph (5):
[0091] In FIG. 1, a digital point-to-point communication line network 1 and a digital mobile communication network 2 (hereunder, the two communication networks are collectively referred to as a "communication line network" as the occasion demands), both of which are connected to each other by a gateway (GW) device for communication protocol conversion, are provided in the first embodiment. On this communication line network, IP (Internet Protocol) packet communication is performed under the TCP/IP (Transmission Control Protocol/Internet Protocol) environment (e.g. the Internet).

Detail Description Paragraph (7):
[0093] At a cell base station 2a of the digital mobile communication network 2, a cellular phone, a mobile or hand-carry type information terminal/PDA (Personal Digital Assistants), and the like as other examples of the communication terminal 4 are accommodated and further an on-vehicle communication navigation terminal 5 mounted on

the user's vehicle is accommodated through a wireless section (air interface).

Detail Description Paragraph (14):
[0100] In FIG. 2, this communication navigation terminal 5 is provided with a self-contained positioning apparatus 10, a GPS receiver 18, a system controller 20, an input and output (I/O) circuit 21, a CD-ROM drive 31, a DVD-ROM drive 32, a hard disk device (HDD) 36, a wireless communication device 38, a display device 40, an audio output device 50, an input device 60, and an outer interface (I/F) device 61. Each component is connected to a bus line 30 for transmitting processing data and control data.

Detail Description Paragraph (15):
[0101] Especially in this embodiment, the wireless communication device 38 constructs one example of a terminal-side wireless device, and the display device 40 constructs one example of a route guidance device with the system controller 20 or the like.

Detail Description Paragraph (21):
[0107] The hard disk device 36 can store map (image) data, which are read in at the CD-ROM drive 31 or the DVD-ROM drive 32, and after this storing, it ran read out them at an arbitrary time. The hard disk device 36 can further store video data and audio data, both of which are read in from the CD-ROM drive 31 and the DVD-ROM 32. Because of this, for example, it becomes possible to read out the video data and the audio data stored in the hard disk device 36 and output them as video and as sound or voice, while reading out the map data on the CD-ROM 33 and the DVD-ROM 34 to perform the navigation operation. Alternatively, it becomes possible to read out the map data stored in the hard disk device 36 to perform the navigation operation, while reading out the video data and the audio data on the CD-ROM 33 and the DVD-ROM 34 and outputting them as video and as sound. Moreover, it becomes possible, by storing into the hard disk device 36 the map data, the video data, or the audio data, which are downloaded by the wireless communication device 38, to read and output them at an arbitrary time.

Detail Description Paragraph (22):
[0108] The wireless communication device 38 has the same structure as that of a general-purpose cellular phone, which is known as TDMA, TDD, or CDMA structure (a high-frequency wireless transmitting/receiving device, an encoding/decoding device, a time division multiplexing device, a control device, an audio input/output device, and the like) in the manner of PDC (Personal Digital Cellular Telecommunication System) or PHS (Personal Handyphone System), for example.

Detail Description Paragraph (26):
[0112] Incidentally, the communication navigation terminal 5 is not limited to the above-described structure. For example, the GPS receiver 18 is built in the communication navigation terminal 5 and is wired and connected to the I/O circuit 21 in the above-described structure. However, it is also possible to employ such a structure that a general-purpose mobile or hand-carry type GPS receiver is wired and connected (interface connected) to the outer I/F device 61. It is also possible to employ such a wireless connection manner that a weak radio transmitting/receiving device (e.g. Bluetooth frequency hopping communication manner) is installed to the general-purpose mobile or hand-carry type GPS receiver at the outer I/F device 61.

Detail Description Paragraph (27):
[0113] In the same manner as the GPS receiver 18 does, the wireless communication device 38 can also employ such a structure that a general-purpose mobile or hand-carry type cellular phone is wired and connected (interface connected) to the outer I/F device 61. It is also possible to employ a wireless connection manner that a weak radio transmitting/receiving device is installed to the general-purpose mobile or hand-carry type cellular phone at the outer I/F device 61.

Detail Description Paragraph (28):
[0114] Moreover, the input device 60 can also employ an infrared ray remote control manner and/or the same weak radio transmission/reception manner as those of the wireless communication device 38 and the GPS receiver 18. The infrared ray remote control manner is designed such that it uses a remote controller to perform infrared ray remote manipulation by user's hands, with an infrared ray reception device and a

decoder built in the communication navigation terminal 5 (in general, they are installed in the vicinity of the display 44).

Detail Description Paragraph (31):
[0117] Especially in this embodiment, the communication control device 73 constitutes one example of a center side wireless device, and the map information processing database device 74 constitutes one example of a search device.

Detail Description Paragraph (40):
[0126] Incidentally, in the case that this communication center apparatus 3 is used as the Internet, it will be a portal site structure. For example, it is provided with a Web server, a FTP (File Transfer Protocol) file transmitting server, a DNS (Domain Name System) server, a FAX/e-mail server, and so on.

Detail Description Paragraph (41):
[0127] A cellular phone as the communication terminal 4 shown in FIG. 1 also has a structure known as the PDC manner and the PHS manner (TDMA, TDD, or CDMA). A PDA or a compact general-purpose computer as the communication terminal 4 also has a familiar structure operation, and each detailed explanation will be omitted. The cellular phone as the communication terminal 4 is equipped with an application (an exclusive browser) for browsing contents of exclusive HTML (Hypertext markup language) tag description, which is accessible to the Internet. Moreover, the PDA or the compact general-purpose computer is also equipped with an application (browser/mailer application program) accessible to the Internet, which is a known structure.

Detail Description Paragraph (48):
[0134] The data processing in the first embodiment, as designed above, and in the second embodiment, as will be described later, is executed mainly by the CPU 22 of the communication navigation terminal 5 shown in FIG. 2 and the microprocessor 72 and the map information processing database device 74 of the communication center apparatus 3 shown in FIG. 3. More concretely, in addition to a computer program for controlling basic operations in the navigation system such as display of a current position, display of a map, and the like, a computer program associated with display control of the optimum route based on the route information received from the communication center apparatus 3, transmission control of the route search request for the communication center apparatus 3, or the like is executed by the CPU 22 of the communication navigation terminal 5 shown in FIG. 2. On the other hand, a computer program associated with search control of the optimum route, reception control of the route search request, or the like is executed by the microprocessor 72 and the map information processing database device 74 of the communication center apparatus 3 shown in FIG. 3. The computer program executed at the CPU 22 may be stored in a built-in memory device such as a RAM 24 or the like in the system controller 20 shown in FIG. 2, or it may be downloaded through the wireless communication device 38 or the like. On the other hand, the computer program executed at the microprocessor 72 and the map information processing database device 74 may be stored in the memory device 76, the DVD-ROM 78, or the like shown in FIG. 3, or it may be downloaded through the line connecting device 71, the communication terminal 79, or the like.

Detail Description Paragraph (53):
[0139] As shown in FIG. 4, a user prepares for a drive plan before a drive (step S101). The user accesses the communication center apparatus 3 through the digital point-to-point communication line network 1 from the communication terminal 4 and inputs a drive plan condition. At the communication center apparatus 3, the input from the user is received at the line connecting device 71 and is led to the microprocessor 72 through the bus 90. The microprocessor 72 searches the map information stored in the map information processing database device 74 on the basis of the presented condition, and it transmits the plan information which meets the presented condition to the communication terminal 4 from the line connecting device 71. If necessary, the presentation of a condition, a search, the presentation of a search result are repeated to make a drive plan. The prepared drive plan is stored in the memory device 76 and is served as an aid on the drive day.

Detail Description Paragraph (55):
[0141] At the communication navigation terminal 5, the drive plan recorded in the semiconductor memory or the magnetic record medium is inputted from the outer I/F 61

and is led to the microprocessor 20 through the bus 30. Alternatively, the drive plan information transmitted through the digital point-to-point communication line network 1, the digital mobile communication network 2, and the cell base station 2a from the communication center apparatus 3 or from the communication terminal 4 is received at the wireless communication device 38, is let to the microprocessor 20 through the I/O circuit 21 and the bus 30, and is recorded into the hard disk device 36 under the control of the CPU 22.

Detail Description Paragraph (59):
[0145] If it is within the service area in step S105, it is possible to access the communication center apparatus 3 through the digital mobile communication network 2 and the cell base station 2a from the wireless communication device 38 of the communication navigation terminal 5 and require the service for the reroute research (step S106). In this case, the current position of the vehicle is transmitted as search data to the communication center apparatus 3.

Detail Description Paragraph (100):
[0186] Incidentally, the display device 40 and the audio output device 50 constituting the communication navigation terminal 5 in the first embodiment can be used for the output device 907 constituting the communication navigation terminal 900. The CPU 22 can be used for the error detection device 905 and the service area determination device 906. The wireless communication device 38 can be used for the transmitting device 901 and the receiving device 902. On the side of the communication center apparatus 910, it is not necessary to add a new apparatus to the communication center apparatus 3 in the first embodiment. The microprocessor 72 may be programmed to organize and operate each constitutional element to operate the second embodiment, which will help it realize.

CLAIMS:

1. A communication navigation system comprising: a communication center apparatus; and a communication navigation terminal, both of which transmit and receive information by a two-way communication through a communication network, (i) said communication center apparatus comprising: a map database for storing therein map database information including information for a route search, which enables the route search from a current position of a movable body to a destination by a predetermined algorithm; a search device for searching, by the predetermined algorithm, for a route heading to the destination from the current position, on the basis of the map database information including the information for the route search, from the destination and the current position received through the communication network; and a center side wireless device for wirelessly transmitting route information indicating the searched route through the communication network, (ii) said communication navigation terminal comprising: a measurement device for measuring the current position; a terminal side wireless device for transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation device for selectively performing a route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

4. The system according to claim 1, wherein the route search is required of the communication center apparatus by said terminal wireless device within a service area of said communication navigation system, in which it is possible to transmit and receive the information through the communication network, in case that the movable body is not on the searched route.

7. The system according to claim 5, wherein said judgment device judges on the basis of an electric field intensity of an electric wave received by said terminal side wireless device.

8. The system according to claim 6, wherein said judgment device judges on the basis of an electric field intensity of an electric wave received by said terminal side wireless device.

15. The system according to claim 1, wherein said communication navigation terminal further comprises a choice device for choosing whether to require the route search of said communication center apparatus by said terminal side wireless device or to perform the simple navigation by said route navigation device in case that the movable body is not on the searched route.

24. A communication navigation terminal for transmitting and receiving information by a two-way communication through a communication network with respect to a communication center apparatus provided with: (i) a map database for storing therein map database information including information for a route search, which enables the route search from a current position of a movable body to a destination by a predetermined algorithm; (ii) a search device for searching, by the predetermined algorithm, for a route heading to the destination from the current position, on the basis of the map database information including the information for the route search, from the destination and the current position received through the communication network; and (iii) a center side wireless device for wirelessly transmitting route information indicating the searched route through the communication network, said communication navigation terminal comprising: a measurement device for measuring the current position; a terminal side wireless device for transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation device for selectively performing a route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

25. A program storage device readable by a computer in a communication navigation system for tangibly embodying a program of instructions executable by the computer to perform method processes of communication navigation at a communication navigation terminal for transmitting and receiving information by a two-way communication through a communication network with respect to a communication center apparatus provided with: (i) a map database for storing therein map database information including information for a route search, which enables the route search from a current position of a movable body to a destination by a predetermined algorithm; (ii) a search device for searching, by the predetermined algorithm, for a route heading to the destination from the current position, on the basis of the map database information including the information for the route search, from the destination and the current position received through the communication network; and (iii) a center side wireless device for wirelessly transmitting route information indicating the searched route through the communication network, said method processes comprising: a measurement process of measuring the current position; a terminal side wireless process of transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation process of selectively performing a route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

26. A computer data signal embodied in a carrier wave and representing a series of instructions which cause a computer in a communication navigation system to perform method processes of communication navigation at a communication navigation terminal for transmitting and receiving information by a two-way communication through a communication network with respect to a communication center apparatus provided with: (i) a map database for storing therein map database information including information for a route search, which enables the route search from a current position of a movable body to a destination by a predetermined algorithm; (ii) a search device for searching, by the predetermined algorithm, for a route heading to the destination from the current position, on the basis of the map database information including the information for the route search, from the destination and the current position received through the communication network; and (iii) a center side wireless device for wirelessly transmitting route information indicating the searched route through the communication network, said method processes comprising: a measurement process of measuring the current position; a terminal side wireless process of transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation process of selectively performing a

route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

27. A program storage device readable by a computer for tangibly embodying a program of instructions executable by the computer to perform method processes of communication navigation in a communication navigation system, said system comprising: a communication center apparatus; and a communication navigation terminal, both of which transmit and receive information by a two-way communication through a communication network, said method processes comprising: (i) at said communication center apparatus, a search process of searching, by a predetermined algorithm, for a route heading to a destination from a current position, from the destination and the current position received through the communication network, on the basis of a map database for storing therein map database information including information for a route search, which enables the route search from the current position of a movable body to the destination by the predetermined algorithm; and a center side wireless process of wirelessly transmitting route information indicating the searched route through the communication network, and (ii) at said communication navigation terminal, a measurement process of measuring the current position; a terminal side wireless process of transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation process of selectively performing a route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

28. A computer data signal embodied in a carrier wave and representing a series of instructions which cause a computer to perform method processes of communication navigation in a communication navigation system, said system comprising: a communication center apparatus; and a communication navigation terminal, both of which transmit and receive information by a two-way communication through a communication network, said method processes comprising: (i) at said communication center apparatus, a search process of searching, by a predetermined algorithm, for a route heading to a destination from a current position, from the destination and the current position received through the communication network, on the basis of a map database for storing therein map database information including information for a route search, which enables the route search from the current position of a movable body to the destination by the predetermined algorithm; and a center side wireless process of wirelessly transmitting route information indicating the searched route through the communication network, and (ii) at said communication navigation terminal, a measurement process of measuring the current position; a terminal side wireless process of transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation process of selectively performing a route navigation on the searched route on the basis of the measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

29. A communication navigation method executed in a communication navigation system comprising: a communication center apparatus; and a communication navigation terminal, both of which transmit and receive information by a two-way communication through a communication network, said method comprising: (i) at said communication center apparatus, a search process of searching, by a predetermined algorithm, for a route heading to a destination from a current position, from the destination and the current position received through the communication network, on the basis of a map database for storing therein map database information including information for a route search, which enables the route search from the current position of a movable body to the destination by the predetermined algorithm; and a center side wireless process of wirelessly transmitting route information indicating the searched route through the communication network, and (ii) at said communication navigation terminal, a measurement process of measuring the current position; a terminal side wireless process of transmitting the measured current position and receiving the transmitted route information through the communication network; and a route navigation process of selectively performing a route navigation on the searched route on the basis of the

measured current position and the received route information or performing a simple navigation with a lower accuracy than that of the route navigation on a route other than the searched route on the basis of the measured current position.

WEST

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L23: Entry 48 of 48 File: USPT May 5, 1998

DOCUMENT-IDENTIFIER: US 5748084 A
TITLE: Device security system

Abstract Text (1):
An object tracking, communication, and management system for a laptop computer or similar device, wherein a beacon or transceiver in the computer implements file integrity or device recovery steps. The beacon protects data, or transmits files or data from computer storage back to the owner or authorized party, either automatically or in response to a request for data recovery, and may broadcast a signal for tracking and recovery of the computer after a theft. Preferably the system also operates in a normal mode to provide or acquire files or data, to or from a remote location, as either requested by the operator or by a third, calling or transmitting party, or automatically, for normal communications or data upkeep. When activated as a security device it implements strategic machine control including enabling, disabling, or modifying functions of the computer and communication of data. The system includes a beacon with preferably both a transmitter and a receiver, internal security logic, and external system elements for locating the beacon via either RF tracking or the communication of its position coordinates back to the owner via the transmitter. A combination of hardware and/or software within the beacon and the host system initiates and coordinates operation of the aforementioned communications or security features. Tamper detection logic implemented in software or hardware responds to tampering or removal of the beacon or other components by alerting via the transmitter and/or disabling functionality of the host. Preferably low level codes operate at the bios level to assure effective operation even when higher level software or plug-in components have been overridden or removed.

Brief Summary Text (8):
These and other problems are addressed by the system and devices of the present invention for the location, communication with, and management of small electronic devices, especially laptop computers but also other microprocessor-containing devices or instruments. For simplicity laptop embodiments are discussed. A tamperproof beacon unit including a transponder or transceiver is placed within the laptop computer. Under normal circumstances the beacon implements a standard communication function for the general communications needs of the device such as e-mail, voice, data, fax, internet or other communication task. When theft of the computer occurs, however, the beacon is activated with a security control program to secure crucial data in the computer's storage, to enable or disable functions of the computer, and to either transmit or destroy or hide sensitive data. The beacon's transmission signal is preferably also trackable to locate and recover the stolen computer.

Brief Summary Text (9):
In one embodiment the device resides in a laptop computer and is largely incorporated in the mother board so it is neither readily detected nor easily removable. In that position it includes or controls a communications link which is preferably a two-way RF link, such as a cellular phone link, and a security module operates or controls the device to initiate or perform object location and file integrity or data security functions.

Brief Summary Text (10):
The security module includes file (i.e., data) security and device security functions, which are initiated upon receipt of an actuation signal indicating theft of the

computer, and which thereafter utilize battery power from the laptop's power pack and available resources to preferentially implement file integrity and tracking/alarm functions. Preferably it disables certain portions of the computer to conserve power to effect a set of priority tasks. The actuation signal is preferably a broadcast signal, sent over a regional area once the owner learns that the computer has been stolen; however actuation may also be triggered by an internal alarm condition, for example a signal indicative that the user has failed to enter a required code or has attempted to remove or disable a component. The file integrity or tracking/alarm functions preferably include at least one and preferably more of the operations of broadcasting out critical files, destroying or encrypting files, and transmitting a tracking RF signal such as a cellular phone signal with a code or message identifying the stolen computer.

Detailed Description Text (3):
FIG. 1 shows a beacon equipped laptop computer 100 of the present invention configured for operating within a terrestrial cellular network, represented by relay station 110. Mobile communications of all types are relayed between the laptop computer and the local cellular transceiver. Such communications may consist of voice, data, faxes, e-mail, pages, file transfers etc. and may be initiated by either the laptop computer user or a calling party. Thus in this embodiment, the computer contains a cellular phone transceiver, and this transceiver is activated by various voluntary or automated applications, to effect the above-enumerated communications functions in a manner known in the art. That is, it may be manually initiated by a user calling out, connecting to another computer or network, and sending or receiving data, or it may include software of a type known in the art to effect automatic file transfer and data backup with a remote host or network, at scheduled intervals. The substantial functionality implemented in this embodiment of the invention allows the major hardware components to be subsumed under the cost of a necessary hardware accessory application, such as a cell modem file saver, for which the high cost is acceptable for many users and the marginal cost of the security-specific hardware and software for implementing the invention, described further below, is low.

Detailed Description Text (4):
As noted, the security system includes a cellular phone RF communications assembly. This device transmits radio waves so that an external tracking circuit may pinpoint the location of the device by suitable detection e.g., using a two-point mobile receiver/signal comparator such as a directional finder mounted in a police vehicle. For a cellular-based system such tracking can be effected largely automatically using existing cellular technology which monitors broadcast i.d. and signal strength in each cell, supplemented with the detailed signal evaluation such as is employed for example for triangulating from cells to pinpoint the source of emergency (911) cellular telephone calls. FIG. 1 also illustrates a tracking apparatus 120 for locating the laptop computer by monitoring its RF transmissions emanating from the beacon. These RF signals may be followed to track the computer to its new location.

Detailed Description Text (14):
This beacon operation is as follows: incoming communications signals are received through the antenna by the cellular transceiver circuitry. This circuitry passes on the raw received signals to the protocol logic and data modem. The protocol logic and data modem determine what type of signal is being received and hence which mode the beacon should be operating in. The wireless modes of operation include an incoming voice telephone call, an incoming fax, an incoming data modem call, or an incoming CDPD packet. This information is passed onto the microprocessor which determines what actions need to be taken within the beacon, and what signals need to be sent to the host computer. The laptop computer preferably relays, or passes the information to, the beacon interface software for processing.

Detailed Description Text (18):
By "low level security codes" we distinguished from other higher level codes that are interpreted by the high-level beacon user interface. The purpose of the low-level codes is to perform the emergency functions under extreme circumstances. This includes the event that the high-level user-interface software is removed. That is, the low-level instructions are executed at a level in the computer at which the removal of the means of interpreting and executing instructions would cause the computer to cease to function at all. A preferred location for these instructions to be handled is

within the computer's on-board bios. In this manner, the low-level security features are made secure against tampering; for example they are not impaired if a thief erases the hard disk, or changes an accessory board.

Detailed Description Text (21):
Another function of the microprocessor is to arbitrate between incoming cellular transceiver data and the phone line interface. It is possible that the computer may be plugged into a phone line and receive a cellular call at the same time. Several actions may have to take place. If the incoming cellular call is a voice call then the protocol logic alerts the microprocessor which may signal the host computer and establish a connection. If the incoming call is a cellular data call, the protocol logic tells the microprocessor whether the modem is already in use on the phone line. If this is the case, since there is only one modem, a decision must be made whether to disconnect the phone connection and reconnect on the cellular. This decision may be preset by user preferences in the high level software or may be set in the microprocessor itself. In any case only one data call can be maintained at a time. This limitation may be remedied by the inclusion of a second modem in the beacon. The same problem arises if the cellular modem is in operation and an incoming call arrives via the phone line. Again the protocol logic and the microprocessor arbitrate between the cellular transceiver and the phone line. It will be understood that incoming land-line calls can contain voice, data, fax, file transfers and security codes just as in the case of cellular calls described above.

Detailed Description Text (23):
The types of transmission possible are the same for outgoing calls as those described above for incoming transmissions. Faxes, e-mails, files, internet connection and voice calls can all be initiated either by the user or automatically for transmission. Voice, e-mails and faxes, and internet connection calls are generally user initiated while automatic transmissions may include some e-mails and some file transfers such as automatic back up file transfers, and the security transfers described below.

Detailed Description Text (27):
Briefly, when the computer is stolen, the user determines whether there are any critical files which must be recovered whether the machine is found or not. The user sends a broadcast to initiate transfer of these files. This is done either through a central clearing house service center, which may for example be operated by a computer security company that provides broad-area RF/cell phone coverage to receive and temporarily store such data, or through the use of additional software e.g., emergency communications software present on another machine. This additional software may be included with the user interface software for installation on the users non-mobile computer and configured to carry out automatic back up and other management functions of the mobile computer. In any case in a theft/notification mode the user determines which files need to be recovered and a request in proper format is sent via the cellular network to the laptop computer with low level security codes. Upon receipt of the lower level codes, the document recovery request is treated as a priority task and the codes are executed as soon as possible, resulting in the transmission of the vital files back to the owner. This step of the security protocol may be augmented by also carrying out the destruction of this data on the laptop, for example by file deletion or overwriting data on the hard disk.

Detailed Description Text (28):
The determination of which files to send over the RF link can also be achieved through application software running on the the computer without the intervention of the user. In this case, when the computer determines itself to be stolen either through an incoming RF broadcast informing it of its "stolen" status, or through one of the additional means described below (i.e., tamper detecting sensors or software tamper detection), the application software itself determines which files need to be transmitted. This determination may be based on the type of file as indicated on an MSDOS system by a three letter file extension, or based on the date of last modification, or the directory under which the files were contained, or by a combination of these methods. For example, the computer might send all word processing files with the file extensions ".TXT" or ".DOC" which have been modified since the last automatic backup.

Detailed Description Text (29):

The security functions described above may also be activated automatically through internal means present on the computer rather than through an RF signal. In accordance with this aspect of the invention, sensors are provided that detect various physical parameters related to the computer such as when the case is being opened or when the antenna or various pieces of the internal hardware are removed or tampered with, and the detected sensor states actuate the security logic to set off the various security features of the beacon. When these sensors detect unusual activity such as removal or physical tampering with a lock, switch, board or antenna, the security logic identifies an alarm condition and actuates the beacon so it performs such actions as erasing the hard drive, calling for help, transmitting important files or the like. In addition to hardware sensors, specific applications running on the computer may be configured to activate the beacon, for instance, when they detect unusual activity such as a failed password entry, an attempt to access a database, or an improper attempt to start the computer.

Detailed Description Text (32):
The invention may be implemented in a number of embodiments, and while the above description sets forth detailed modes of operation for a cellular phone embodiment for which a transceiver and cell modem are available for communication, other embodiments may be implemented within the constraints of other communications links. Thus, for example, an RF pager-based system may receive its actuation signals, and receive messages designating actions to be taken or identifying files to be secured-e.g. erased or encrypted- and may transmit its ID or a tracking signal via a pager or other transmitter.

Detailed Description Text (33):
FIG. 6 shows such a system 200. In this embodiment the RF signal in an antenna 60 is demodulated and amplified by a receiver 202 and the demodulated transmission is fed to a protocol decoder 204. Briefly, transmissions are effected in TDMA and the pager reception is synchronized with a synch signal to turn on during its designated message interval. The data it receives, e.g. several message words or more as the technology permits, is passed to the activation logic 206 which in this case corresponds in part to the security logic function described above; it compares the beacon ID number to the received address or may determine if an additional message designating a "stolen" state is received. It then performs one or more of the transmission and internal security actions described above.

Detailed Description Text (36):
While the invention has been described above in connection with specific embodiments and alternative implementations, modifications and variations thereof will occur to those skilled in the art in the light of the foregoing description. In particular, while the beacon has been described in relation to the management of laptop computers, it is also applicable to control or monitor any electronic device such as a PDA, a movable piece of industrial electronic equipment, and the like. In addition, the beacon need not contain all the functions described, but may contain only a subset of these functions. For instance the beacon may contain only a receiver which accepts security commands and operates as described to overwrite files or to shut down or restrict operation of data devices in the laptop, or it may have only a transmitter which is activated automatically by the computer and transmits out files and tracking signals. While the preferred embodiment has been described as a system operating within the AMPS cellular phone network, other embodiments of the present invention may operate under GSM, PCS, Pager, Satellite, LAN, or other wireless communication system. Accordingly, the invention is intended to embrace all such alternatives, modifications, variations within its spirit and scope, as defined in the following claims.

CLAIMS:

4. A system according to claim 1, wherein said security means is operative to initiate a trackable RF transmission by said beacon and also to selectively disable higher functionality of the laptop computer thereby assuring that battery power is applied first to a security transmission.